Comprehensive Energy Plan / Vermont Climate Council Cross-Sector Mitigation Subcommittee Electric Sector Workshop

August 10, 2021, 10 a.m. - 2 p.m.

Link to join: https://us02web.zoom.us/j/6050832511
To join by phone, dial **929-205-6099**. Webinar ID: 605 083 2511#
(No participant ID or password is required)

Welcome! The meeting will get started shortly.

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Introductions

Hosts

Ed McNamara, Department of Public Service

Liz Miller & Chad Farrell, Vermont Climate Council Cross-Sector Mitigation Subcommittee

Facilitator

Cindy Cook, Adamant Accord

Guests

Please introduce yourself (name, organization) using the chat function!

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Workshop Objectives

Gather input on electric sector policies, programs, and strategies currently in place or that should be in place with an eye toward:

Trade-offs made when assessing policy options and the basis for those trade-offs

- What decision-making criteria should be used to make such trade-offs?
- How should these criteria be employed in the context of making choices regarding the State's energy future?

Strategies, policies, and programs that are (or are not) working to meet renewable energy and climate goals in the electric sector?

- Recommendations regarding alternatives to consider (ex. Climate Council policy drafts)
- How to address equity in the sector/what is currently being done and/or planned to address
- Strategies and options for regions and municipalities to employ

Agenda

10:00 Welcome and Introductions, *PSD & VCC CSM*
10:05 Review Agenda, Forum Etiquette Guidelines and Zoom Logistics, *Facilitator*
10:10 Overview of the CEP/CAP Development Process, *PSD & GWSA Director*
10:25 State of the State: Where are we and where are we going, *PSD*
10:45 Session I: Equity in Renewable Energy Planning
11:45 Break
12:00 Session II: Design Considerations for 100% Renewable Energy Standard in VT
1:55 Next Steps and Future Opportunities for Input, *Facilitator*
2:00 Adjourn

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Workshop Etiquette and Zoom Logistics

- CEP public meeting etiquette guidelines available here: https://publicservice.vermont.gov/content/2022-plan
- Please remain muted with video off during presentations. We welcome participants to turn their video on while speaking during discussion sessions.
- As a reminder, this workshop is being recorded and will be posted on the CEP website after the event.
- During the workshop, participants will have multiple opportunities to ask questions or provide comments:
  - To make a comment directly, if joining remotely please use the “raise your hand” function during discussion sections. If in person, please raise your hand as well.
  - Alternatively, remote participants can provide comments via the chat function. Callers will be invited to press*6 to unmute during Q&A to ask their question during the Q&A.
  - So that everyone has an opportunity to speak, we kindly ask that you keep your remarks to 2-3 minutes at a time. At the end of the workshop, we will discuss opportunities for future input as well.

Vermont Comprehensive Energy Plan – 2022

Ed McNamara, Director of Planning
Vermont Public Service Department

GWSA Climate Action Plan

Jane Lazorchak, Director of GWSA
Agency of Natural Resources

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Vermont Energy Policy

Title 30, Section 202a:

- To ensure, to the greatest extent practicable, that Vermont can meet its energy service needs:
  - In a manner that is **adequate**, **reliable**, **secure**, and **sustainable**
  - Ensuring **affordability** and encouraging the state's **economic vitality**
  - Using energy resources **efficiently** and managing demands **cost effectively**
  - In a manner that will **achieve greenhouse gas reductions requirements**

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Comprehensive Energy Plan - Two Plans

Comprehensive Energy Plan (30 V.S.A. § 202b)	Electric Plan (30 V.S.A. § 202)
• Comprehensive 20-year analysis and projections of the use, supply, cost, environmental effects all energy sources used in VT	• 20-yr assessment of *electric* demand, supply, strategies

- CEP Required Every 6 years – next due **January 2022**

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Comprehensive Energy Plan – *Requirements*

- Must include standards and recommendations for Act 174 enhanced energy planning
- Must be consistent with GHG reduction requirements, GWSA Climate Action Plan, relevant goals of Title 24, Section 4302

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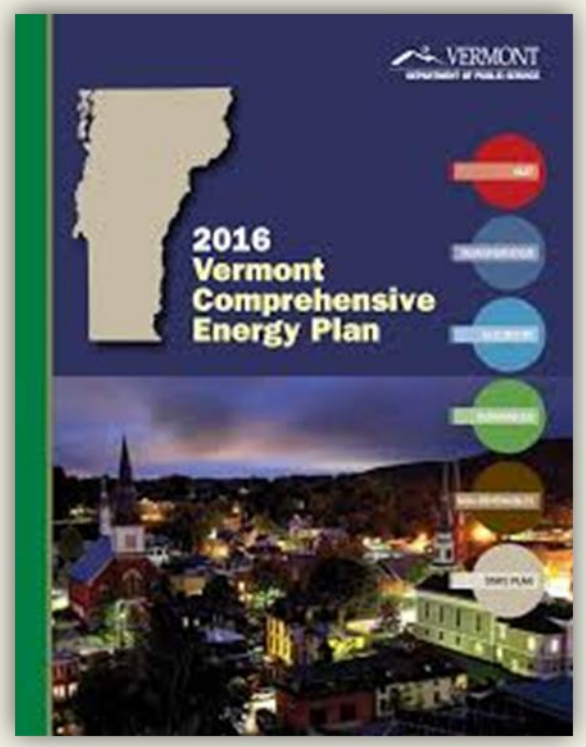
2016 Comprehensive Energy Plan

- Last CEP published in January 2016
- 90% renewable (all sectors) by 2050
- Over 300 recommendations



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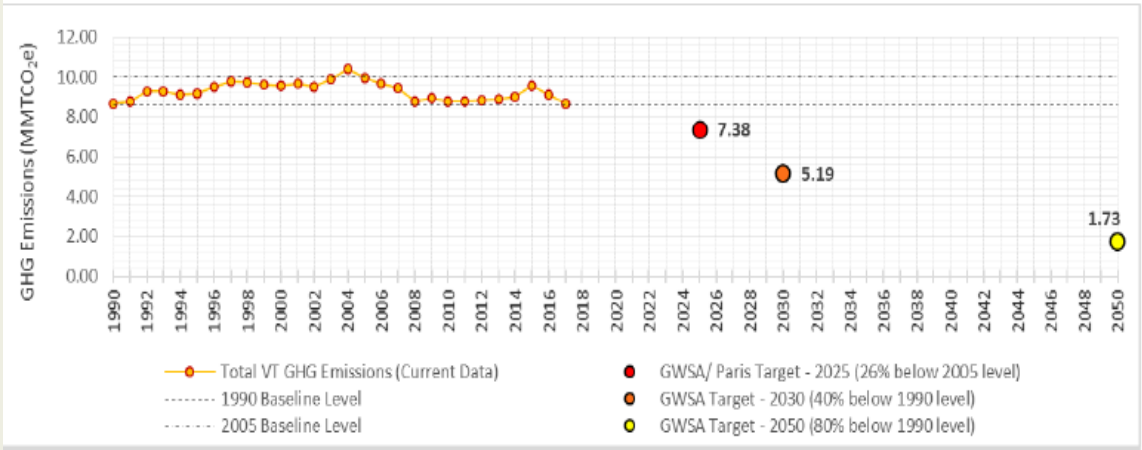
2022 CEP Starting Points

- 90% renewable by 2050 *as a starting point*
- 10 V.S.A. 578 Requirements – GHG Emissions reductions equal to:
  - Not less than 26% relative to 2005 emissions by 2025 (Paris Accord)
  - Not less than 40% from 1990 emissions by 2030 (2016 CEP)
  - Not less than 80% from 1990 emissions by 2050 (2016 CEP)



VT GHG Inventory. VT DEC AQCD May 2021

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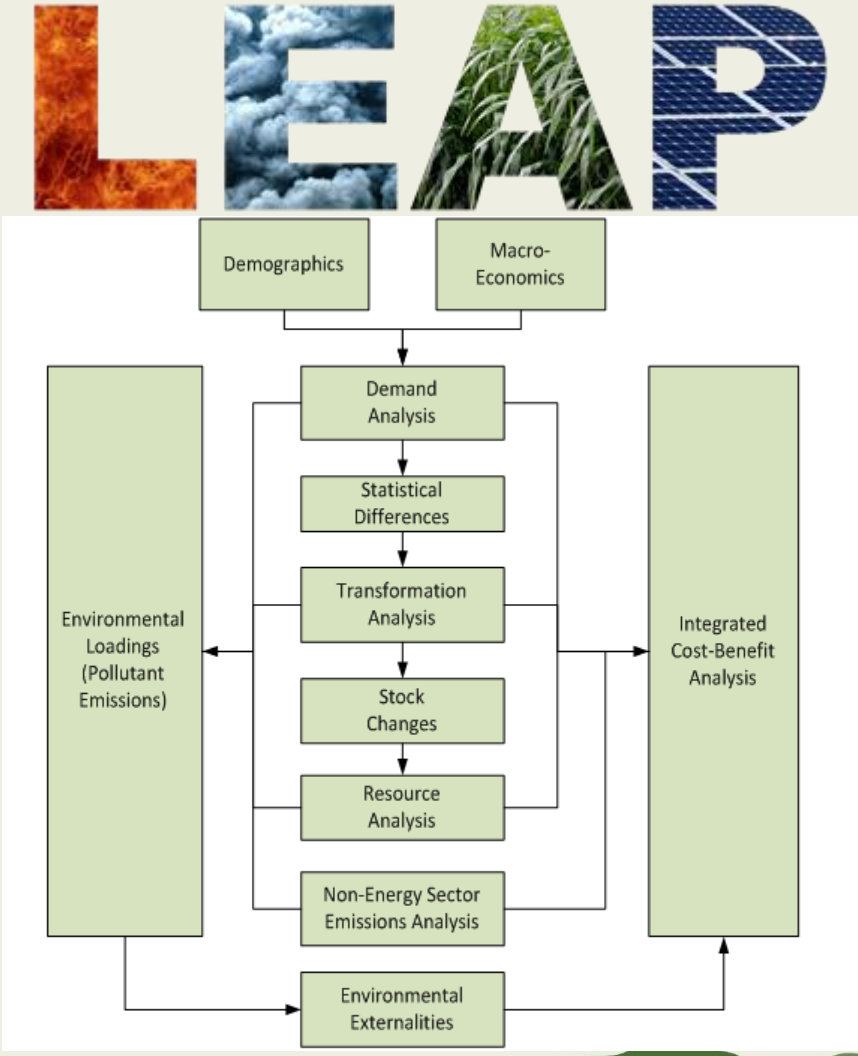
2022 CEP Vision

- Focus on a strategic plan that identifies
  - Tradeoffs among policies
  - Milestones for identifying success and need for modification in policies
  - Uncertainties that could affect policy success
- Includes
  - Act 174 standards & recommendations
  - Climate and Renewable Energy Pathways
  - Electric Plan
  - State Agency Energy Plan

2022 CEP Modeling

- Scenario analysis
  - Working with ANR, NESCAUM, Stockholm Environment Institute using Low Emissions Analysis Platform (LEAP)
  - Reference, Do Nothing" case plus policy and technology scenarios
- Energy modeling for CEP, non-energy sectors already planned
  - LEAP is scenario-based modeling tool that can track consumption, production, and resources in all sectors
  - Plan to regionalize results after initial modeling effort is complete
  - Local and regional air pollutants in addition to GHG



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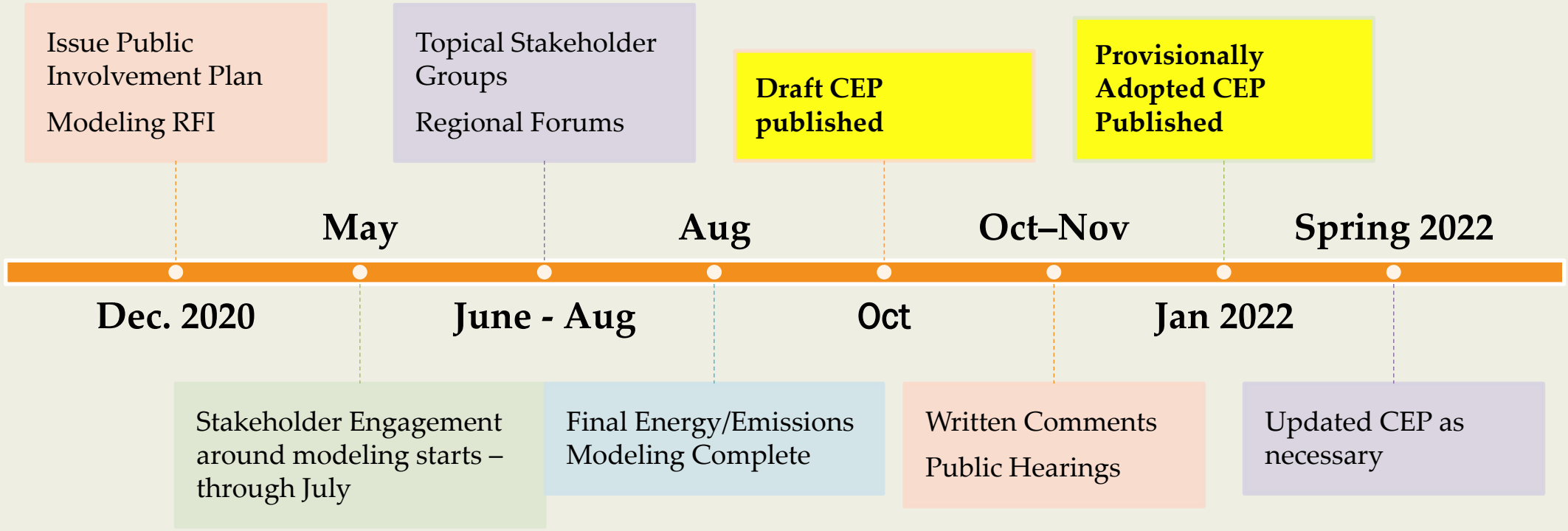
2022 CEP Tentative Timeline (as of 8.10.21)



Coordination with Stakeholder Engagement / Timing of Climate Council

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Global Warming Solutions Act – Key Dates

- General Assembly (GA) had 60 days from enactment (Sept 23, 2020) to make appointments
- Administration had 30 days from receiving final appointment (Oct 23, 2020) to convene first meeting of the Council
  - First meeting was held November 20, 2020
- Subcommittees Began Meeting – February 2021
- **Council adopts Initial Climate Action Plan – Dec 1, 2021**

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Vermont Climate Council

Steering Committee

Subcommittees (in Statute)

- Rural Resilience and Adaptation Subcommittee
- Cross-Sector Mitigation Subcommittee
- Just Transitions Subcommittee
- Agriculture and Ecosystems Subcommittee
- Any other Subcommittees identified by the Council
  - Science and Data Subcommittee

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Global Warmings Solutions Act

Vermont Climate Action Plan Requirements

1. Reduce greenhouse gas emissions from the transportation, building, regulated utility, industrial, commercial, and agricultural sectors;
2. Encourage smart growth and related strategies;
3. Achieve long-term sequestration and storage of carbon and promote best management practices to achieve climate mitigation, adaption, and resilience on natural working lands;
4. Achieve net zero emissions by 2050 across all sectors;
5. Reduce energy burdens for rural and marginalized communities;
6. Limit the use of chemicals, substances, or products that contribute to climate change; and
7. Build and encourage climate adaptation and resilience of Vermont communities and natural systems.

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Global Warmings Solutions Act

Clear Sequence of Work

1. Five Subcommittees Defined in Statute to Develop the Work
   - Rural Resilience and Adaptation, Agriculture and Ecosystems, Cross Sector Mitigation, Just Transitions and Science and Data
2. Each Subcommittee following Clear Sequence of Work
   - Inventory existing programs to meet GWSA requirements
   - Identify, analyze and evaluate new strategies/programs needed to meet GHG requirements
   - Develop financing strategies for actions ready to implement
3. Develop monitoring strategy for assessing
4. Identify rules to be adopted (by ANR) by 2022
5. Adopt the Vermont Climate Action Plan by Dec 1, 2021 and update the Plan every four years thereafter.

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Framework for Climate Action Plan

Pathways ➡ Strategies ➡ Actions

Cross-Sector Mitigation, Agriculture and Ecosystems and Rural Resilience and Adaptation

- A **pathway** is a high-level means of achieving GHG emissions reductions or adaptation, resilience, and sequestration goals. While written broadly, pathways should be stated specifically enough so that it is possible to assess whether progress has been made in achieving them.
- A **strategy** is a statement of measurable activity, a benchmark, to be reached in pursuit of the pathway. Strategies should be measurable and are a more specific subset of pathways.
- **Actions** are the "operational" tasks that the state will undertake to meet the pathways and strategies. Actions may be written around existing, or propose new, policies, programs, projects, initiatives, plans, etc.

These will be further developed in the coming months, informed by public engagement and technical analyses.

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Leading with Equity as a Core Component

The term “Just Transitions” is a way of framing for government and business action on climate change. Its work encompasses both public policies and business action to deal with the impacts of industry transition away from greenhouse gas emissions for jobs and livelihoods (the transition "out") and aims to generate the low or zero greenhouse gas emission jobs and livelihoods of a sustainable society (the transition "in"). Guiding Principles for a Just Transition, June 2021

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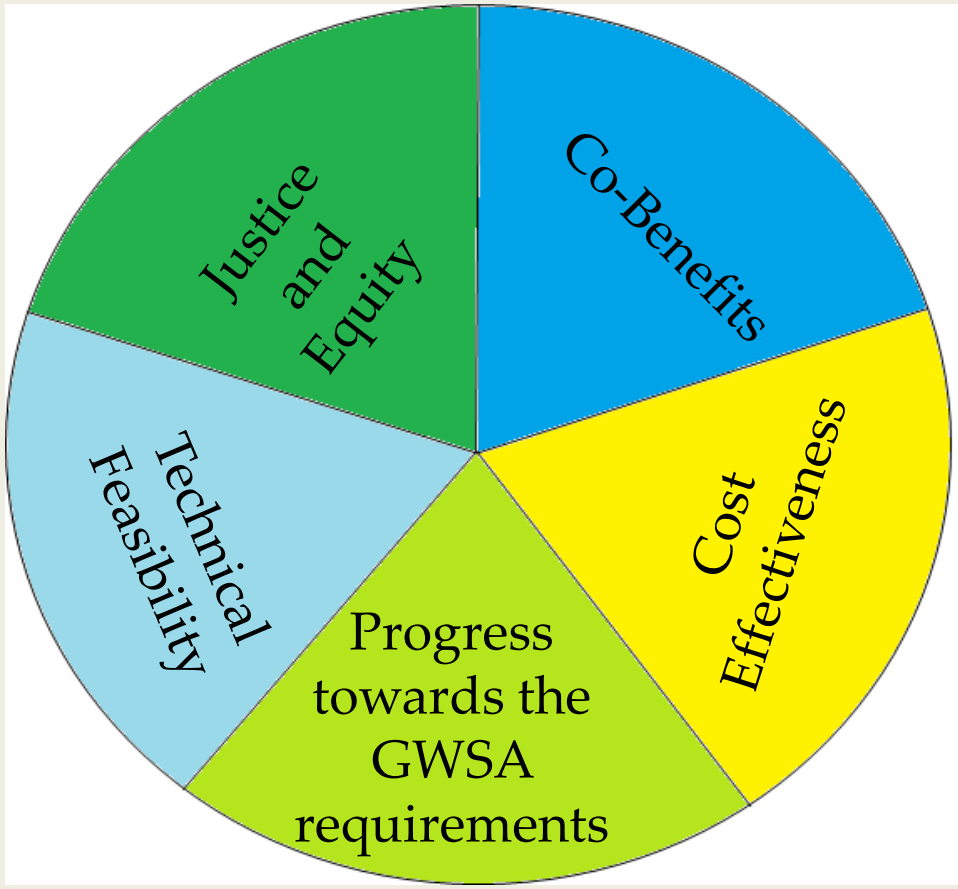
Climate Action Plan



Short term priorities

Long term priorities

Mitigation Strategies (emissions reduction)

Sequestration Strategies

Resilience and Adaptation Strategies

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Process to Date

1. Scope of Work Refined for Subcommittees
2. Subcommittee membership developed - technical expertise and diversity considered
3. Initial Ideas Explored by Task Leads
4. Presentation and Discussion
5. Pathways Presented

PUBLIC ENGAGEMENT TIMELINE

2021 | 2022

AUG | SEPT | OCT | NOV | DEC | JAN | FEB | MAR

- Social media, website, outreach materials, survey, stakeholder events
- Statewide and regional events, partner supported events
- Meet with Council and sub-committees to review findings
- Initial plan launch and promotion
- Statewide events, partner support
- Deliberation platform on elements for further refinement
- Meet with Council and sub-committees to review findings
- Comprehensive plan promotion

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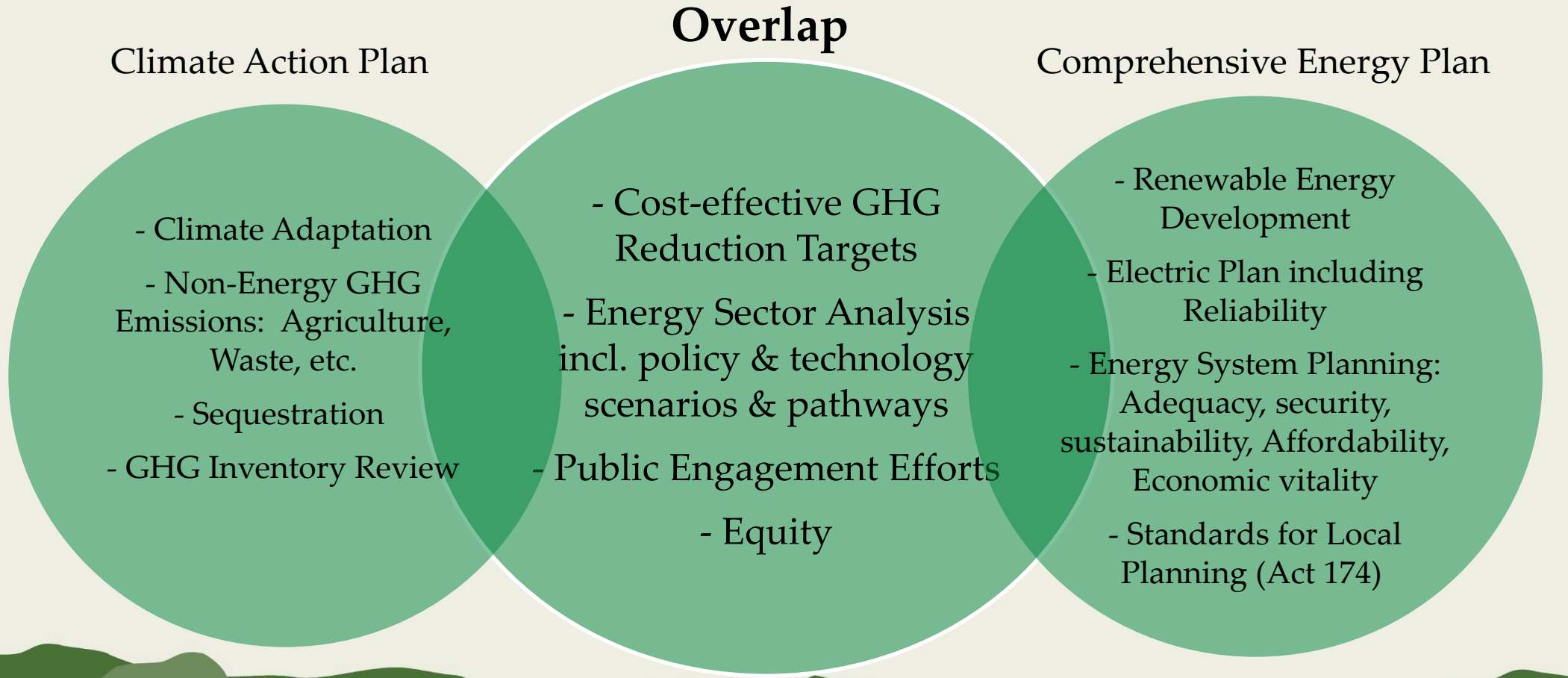
Energy Plan & Climate Plan



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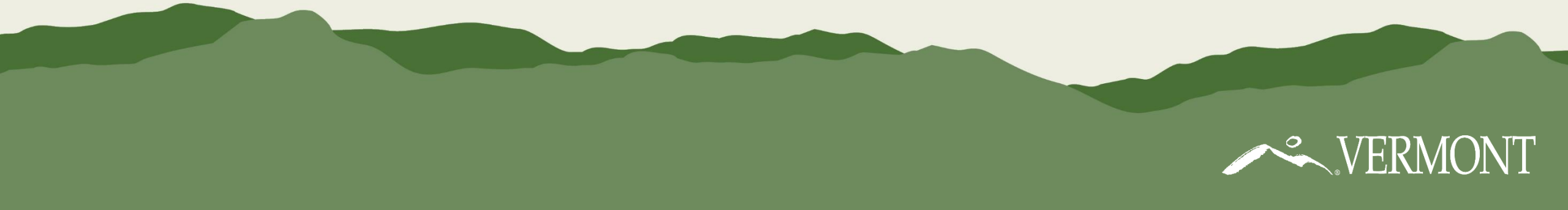
Thank You!



Questions?

- Type your questions in the chat, “raise your hand” to be called on and ask your question verbally (or request to do this in the chat if you don’t have that functionality), or press *6 when telephone callers are invited to ask questions.
- You can send comments on the CEP by email (or mail) to: PSD.ComprehensiveEnergyPlan@vermont.gov
- You can send comments on the CAP via the public input portal: https://anrweb.vt.gov/ANR/ClimateCouncil/PublicInputForm.aspx?PKID=3209

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Electric Sector Overview

Where are we now and where are we trying to go?

Ed McNamara

Public Service Department

August 10, 2021

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Statutory Context

Vermont Energy Policy

30 V.S.A. § 202a – State Energy Policy

- "To ensure to the greatest extent practicable that Vermont can meet its energy service needs in a manner that is adequate, reliable, secure, and sustainable; that ensures affordability and encourages the State's economic vitality, the efficient use of energy resources, and cost-effective demand-side management; and that is environmentally sound"

Multiple additional considerations, including renewable energy goals (30 V.S.A. § 8001)

- Support development jobs and economic development while retaining and supporting existing renewable infrastructure
- Provide incentives to enter into long-term stably priced renewable energy contracts
- Encourage diversity in plant capacity and type

Least-cost Planning

- Electrical Energy Plan (within CEP) “shall be based on the principles of ‘least-cost integrated planning’”
- “meeting the public's need for energy services, after safety concerns are addressed, at the lowest present value life cycle cost, including environmental and economic costs”
- Basic message: Meet GWSA requirements/renewable goals and provide a reliable grid at the lowest reasonable cost

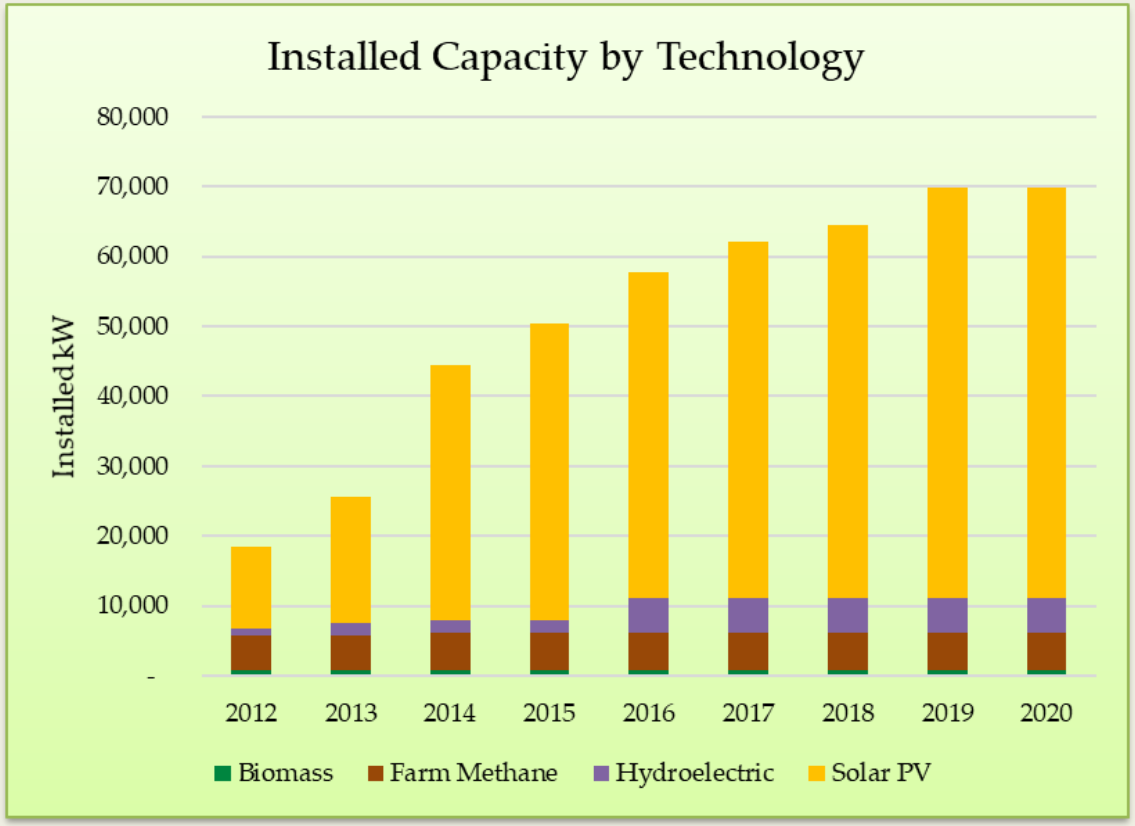
Programs for Renewable Generation

SPEED

- Sustainably Priced Energy Enterprise Development (SPEED) Program
- Created in 2005
- Required utilities to enter into long-term stably priced contracts for renewable resources
- Did not require retirement of RECs
- Projects included: 4 wind projects (140 MW); 2 landfill gas (11 MW); 3 hydro (11 MW)
- Replaced with RES in 2015

Standard Offer

- Created in 2009
- Single, statewide procurement process for small (2.2 MW or less) renewable resources
- Initially 50 MW, expanded to 127.5 MW in 2012
- Does not require retirement of RECs



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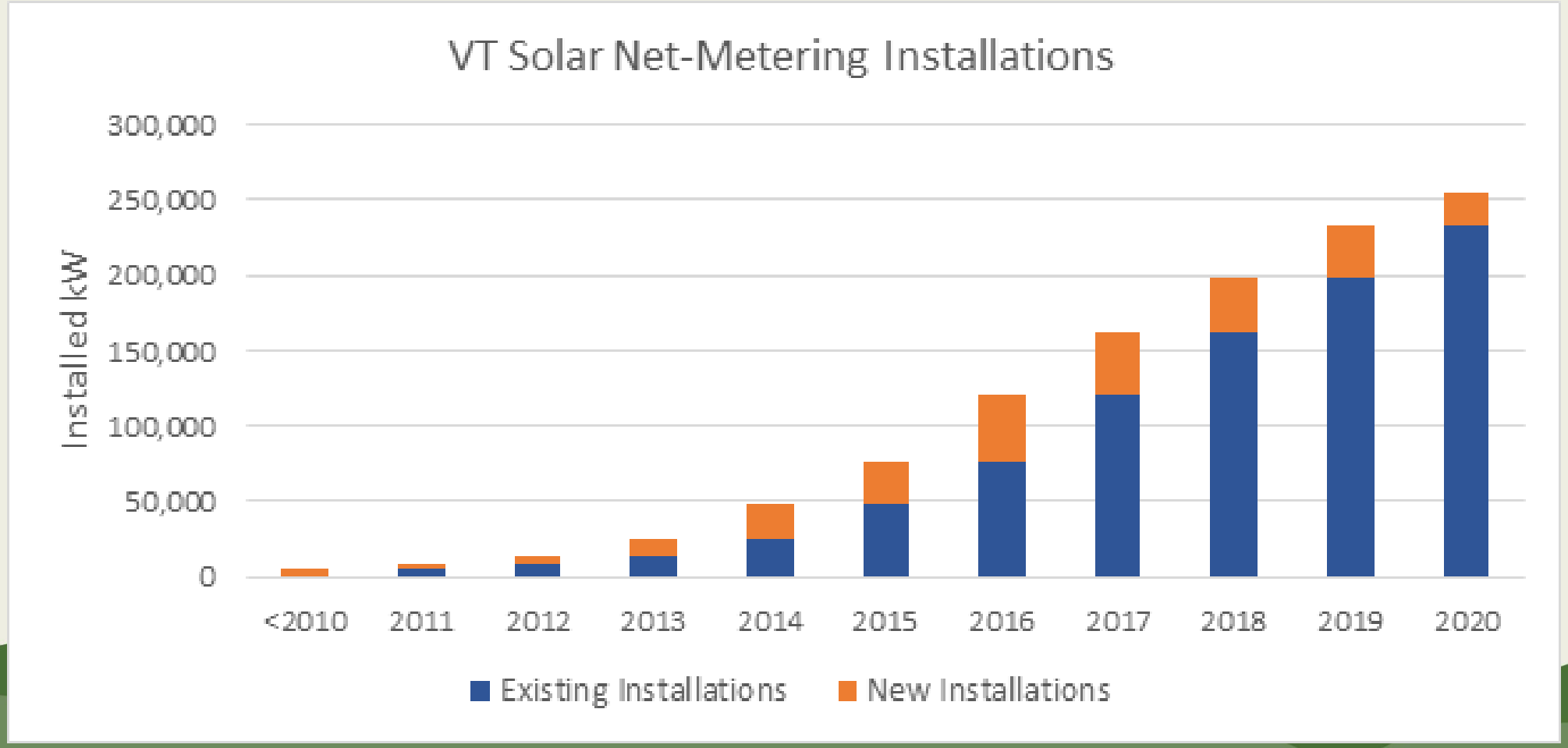
Net metering

- Started in 1999
- 2008 – allowed group net metering, expanded overall cap from 1% to 2%; increased project size cap to 250 kW
- 2011: Project cap expanded to 500 kW; registration process for small systems begins; overall cap expanded to 4%; solar adder introduced
- 2014: Cap expanded to 15%; NM 2.0 process initiated
- 2017: NM 2.0 starts; compensation based in part on whether RECs are given to utility

Net Metering Installations



Renewable Energy Standard

- Tier 1: Total Renewable Energy
  - No limitations on size, age, location
  - 55% of load in 2017 –> 75% of load in 2032
- Tier 2: Distributed Renewable Energy
  - Must be located within VT, under 5 MW, commissioned after 6/30/15
  - 1% of load in 2017 –> 10% of load in 2032
- Tier 3: Energy transformation
  - Reduction in customers' fossil fuel usage

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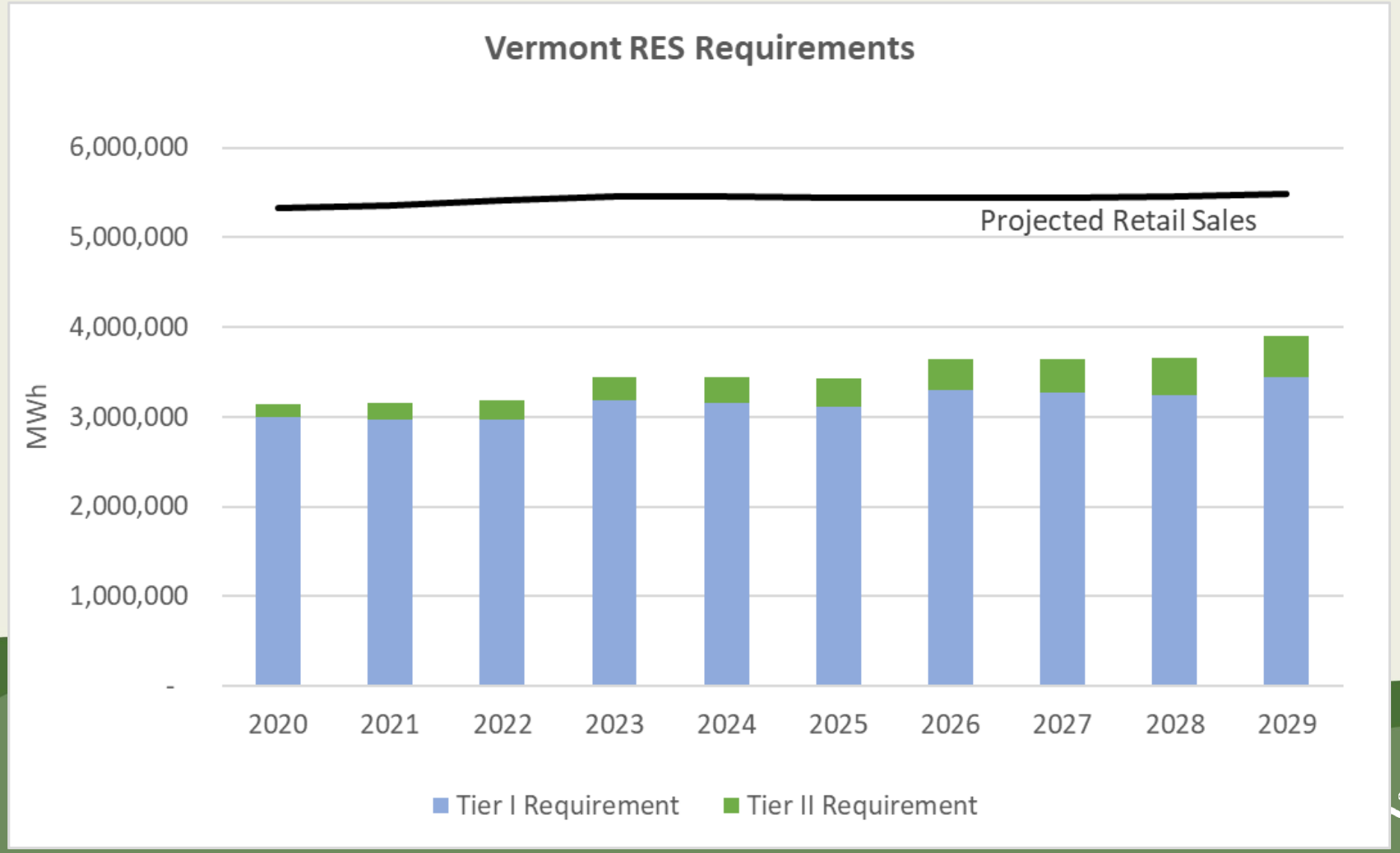
RES Tiers 1&2 Requirements



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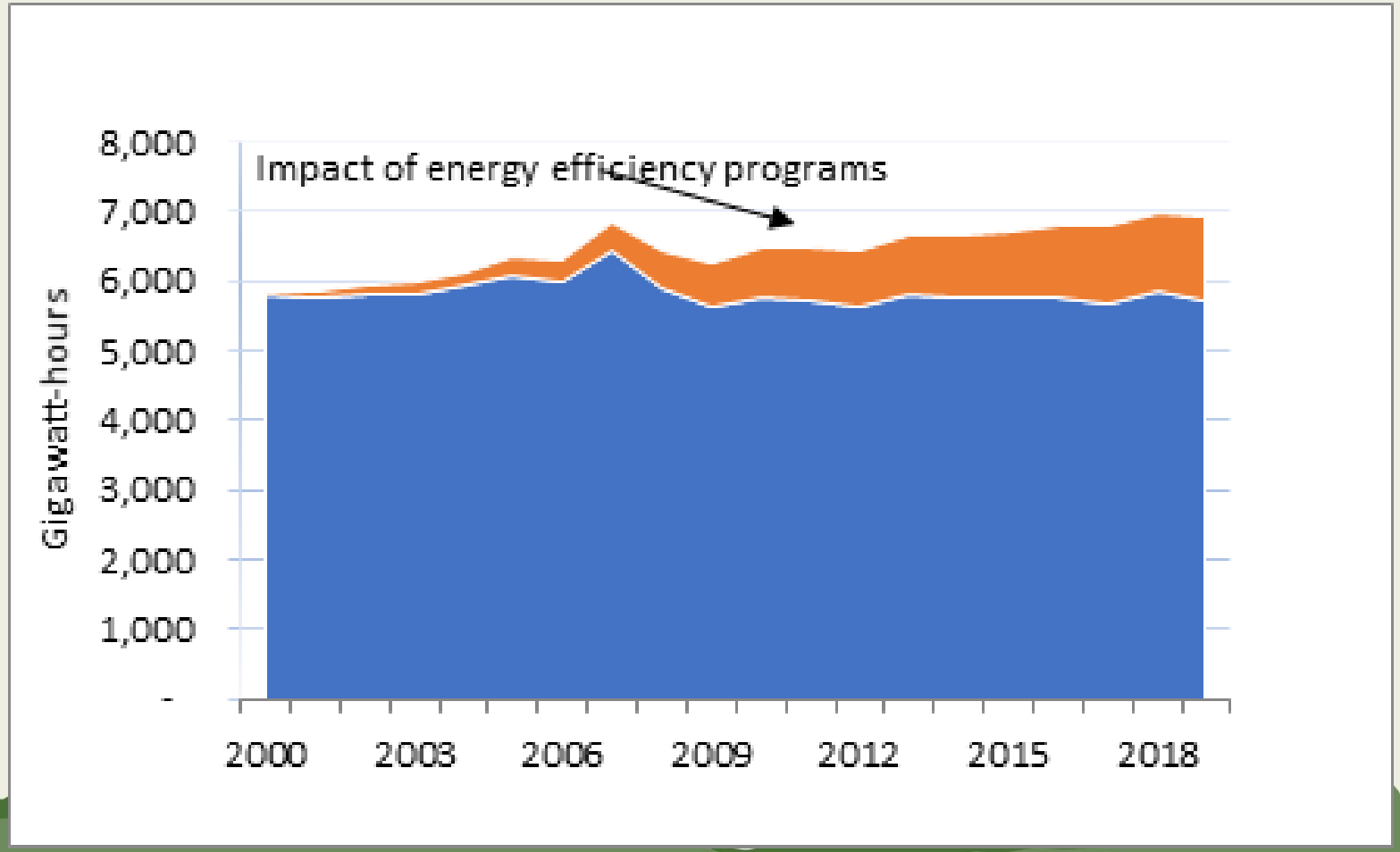
Existing Resources

Energy Efficiency

- “First fuel”
- Budgets and Quantitative Performance Indicators set every three years



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Renewable Generation Within Vermont

- 400 MW distributed solar
- 200 MW hydro
- 150 MW wind
- 70 MW biomass
- 11 MW landfill gas
- 5 MW methane digesters

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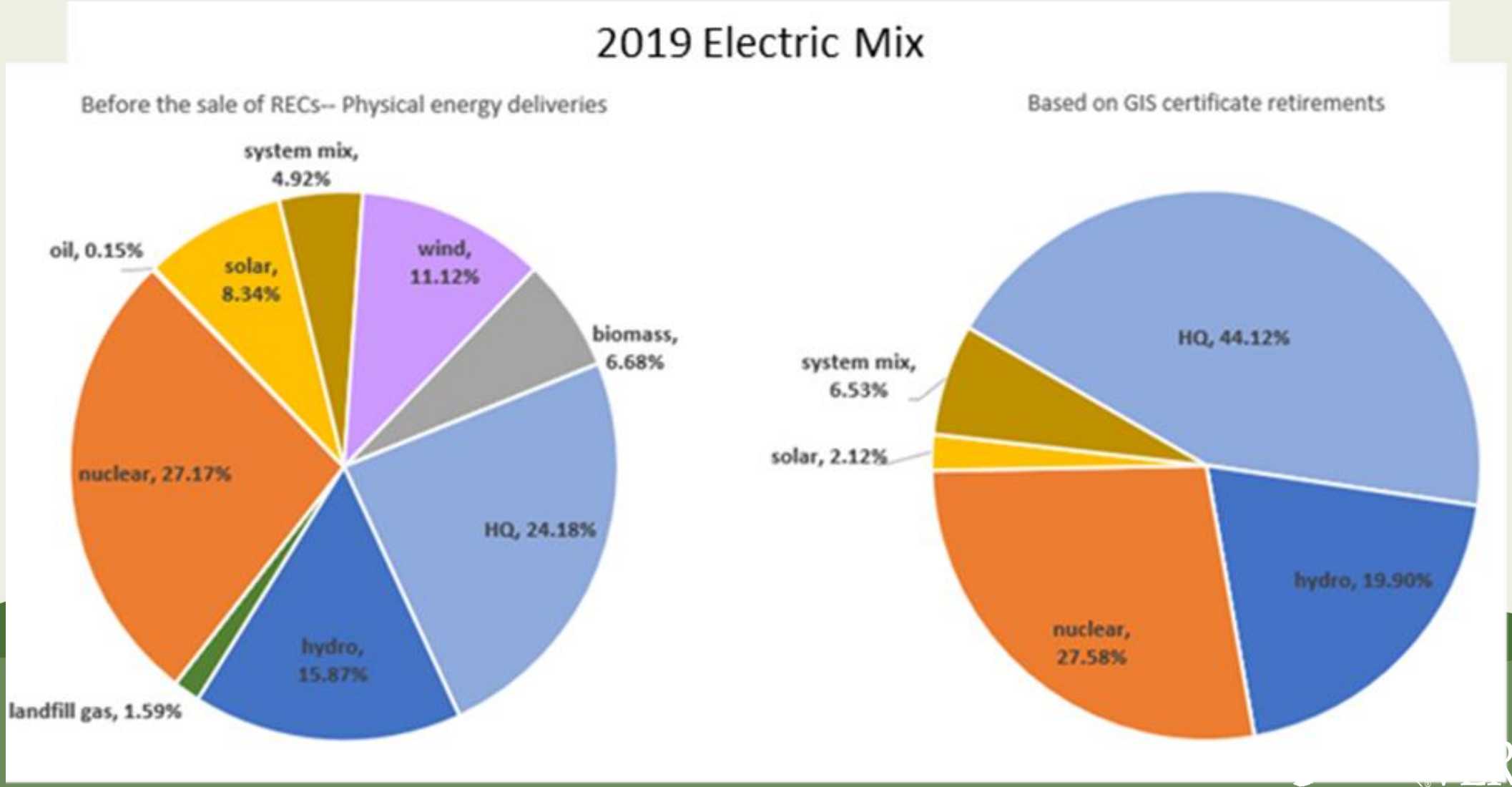
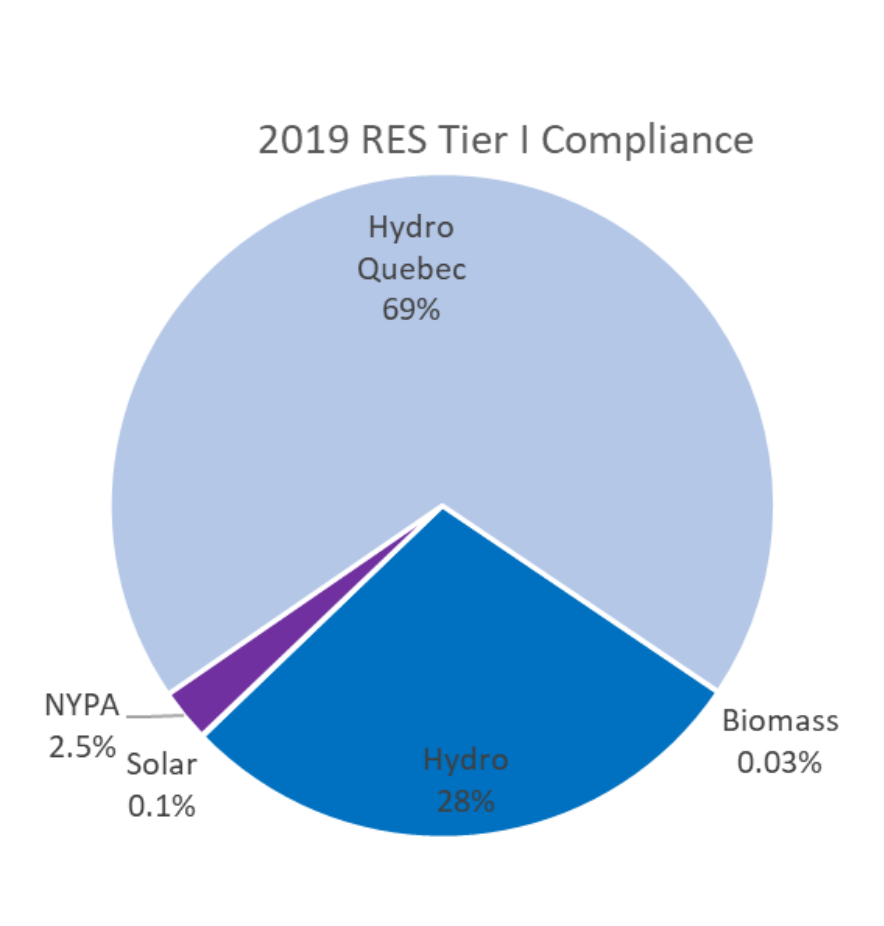
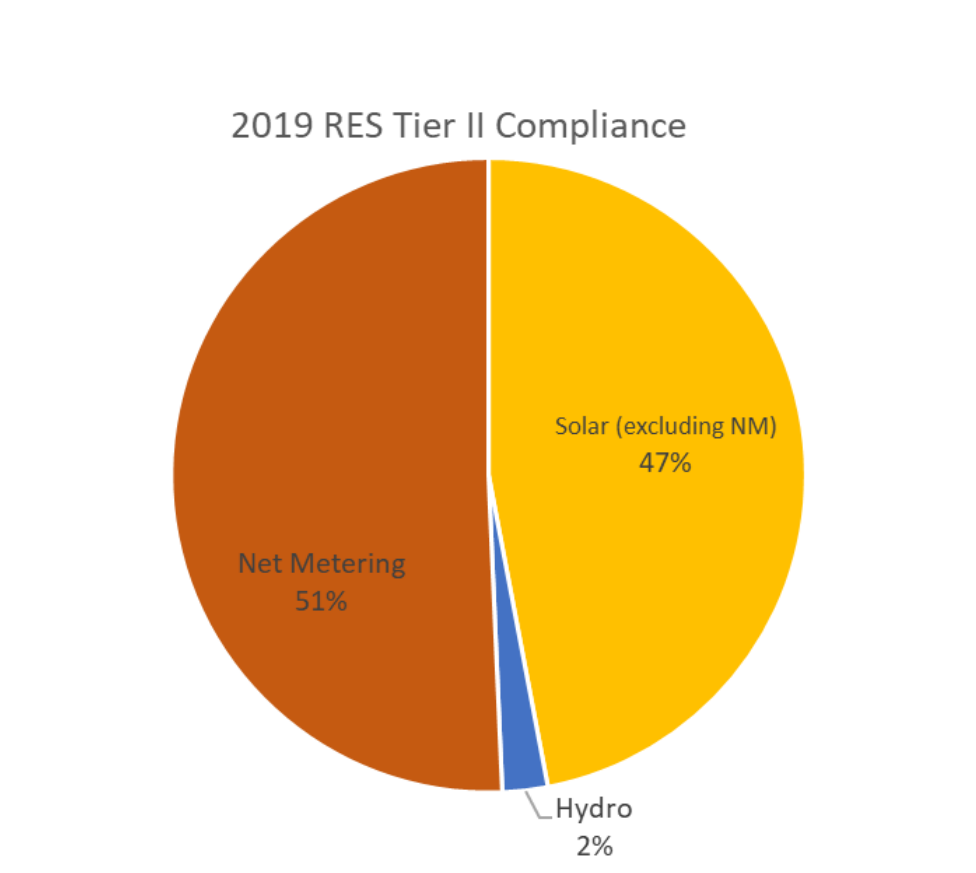
Energy vs. Renewable Energy Credits

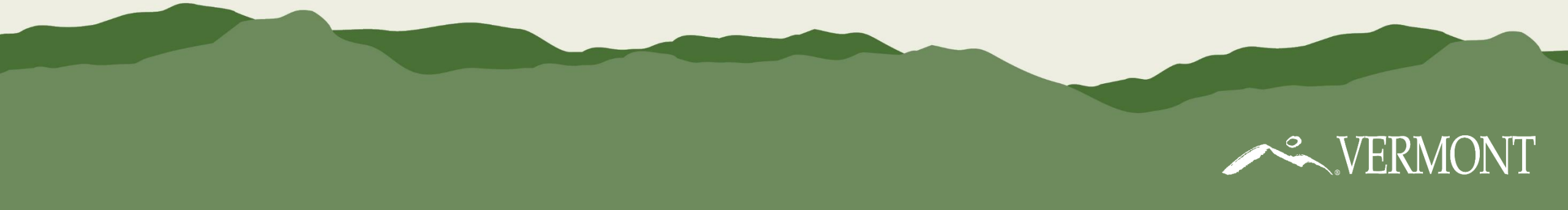


RES Compliance by Resource Type

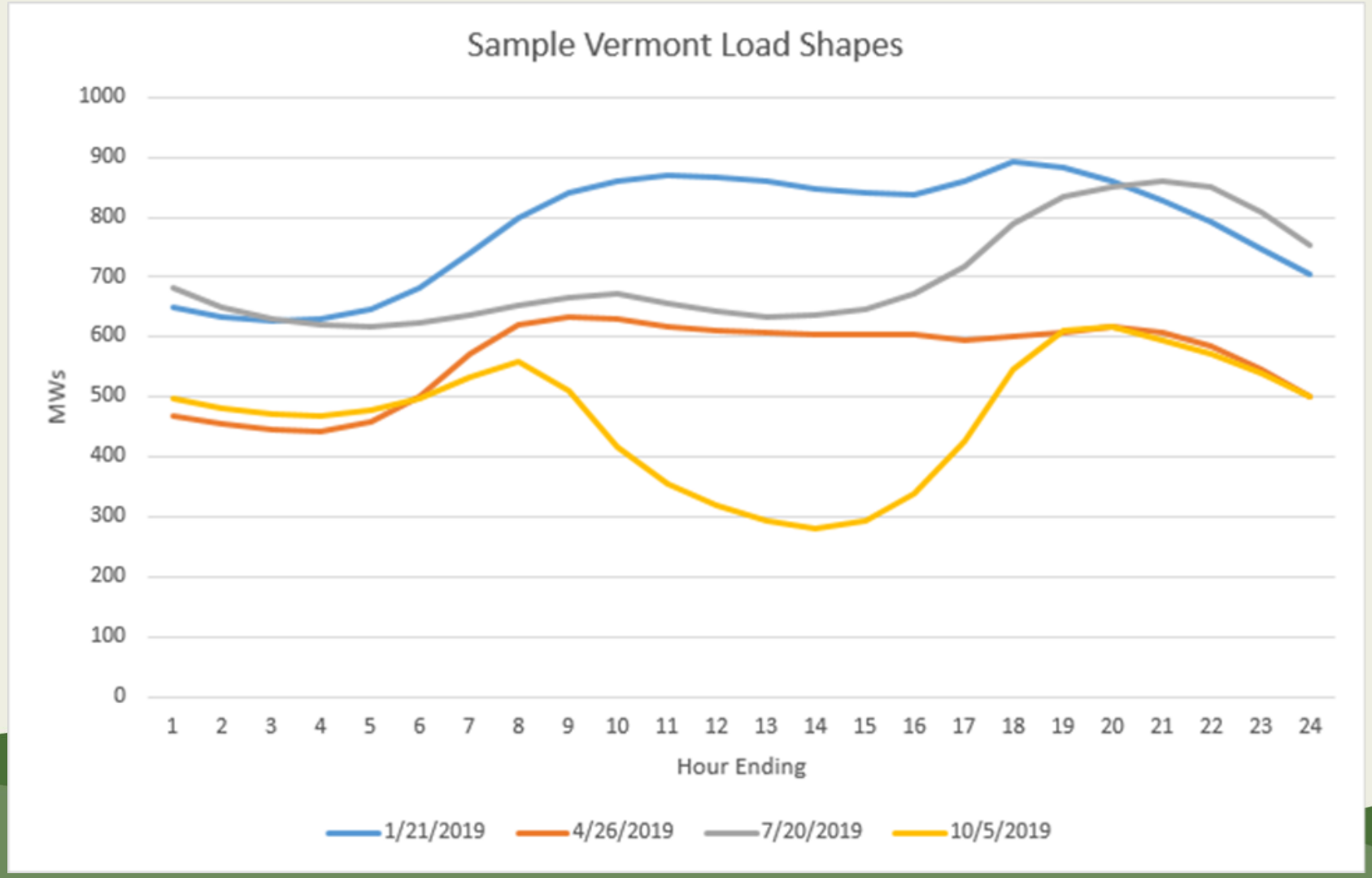




System Considerations



Vermont Seasonal Load Profiles



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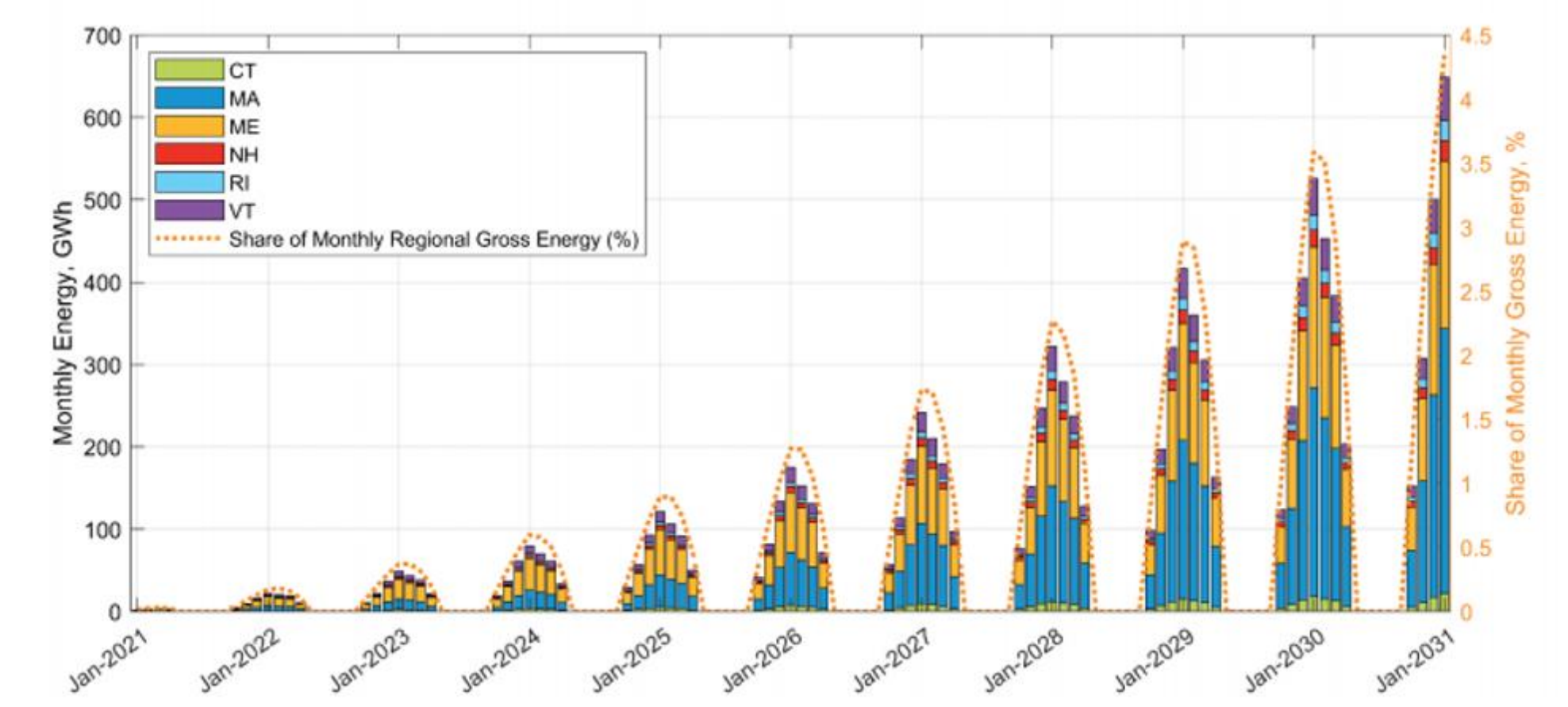
Electrification and load (thermal)



Source: ISO-NE Final 2021 Heating Electrification Forecast, at slide 14.
lfc2021_final_heating_elec.pdf (iso-ne.com)

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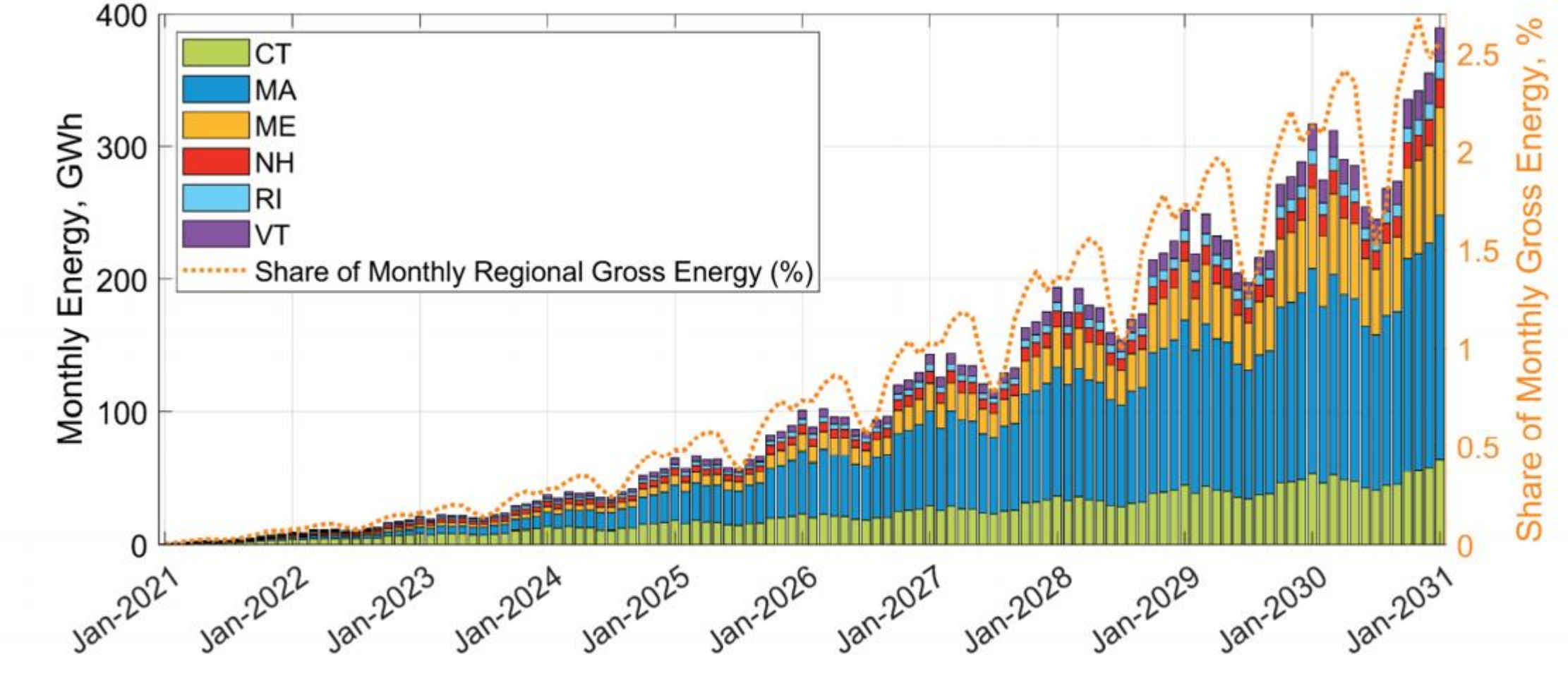
Electrification and load (EVs)



Source: ISO-NE 2021 Final Transportation Electrification Forecast, at slide 12. [evf2021_forecast.pdf (iso-ne.com)]

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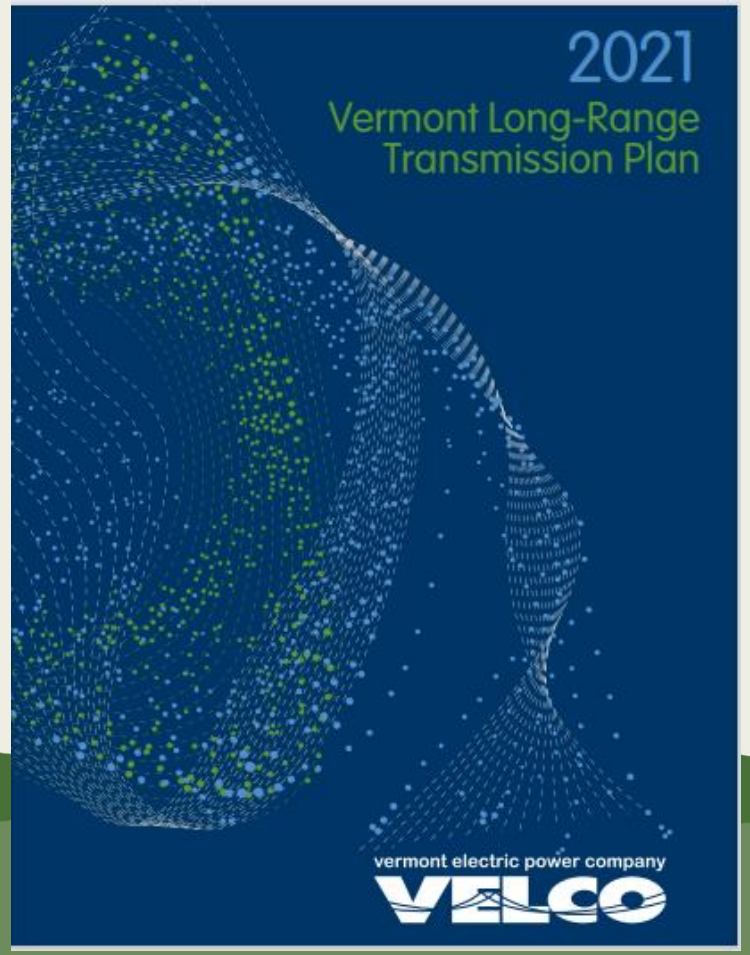
Hosting Capacity



- “If solar PV continues to be developed in the same way as it has in the past, the analysis suggests that solar PV growth will introduce system operating concerns….”
- “The impacts may be mitigated by careful planning of solar PV deployment on a statewide basis.” VELCO LRTP at 47.

Questions?

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Session I

Equity in Renewable Energy Policy

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EQUITY IN THE ELECTRICAL SECTOR

Nadia Marquez Pabst

August 2021

OVERVIEW

I. Introduction

II. What is “Equity”?

III. Factors That Can Increase Climate Vulnerability

IV. Equity in Context: CPUC’s Self-Generation Incentive Program

V. 7 Steps for Building Equity into Policy Design

VI. Equity through Environmental Justice

INTRODUCTION

Nadia Marquez Pabst

Cruise Automation, Honda / General Motors' All-Electric Self-Driving Fleet

NextEra Energy / Florida Power & Light, Nation's Largest Electric Utility & World's Largest Wind/Solar Developer

Advanced Microgrid Solutions, Advanced AI software for DERs & Storage + Renewables Developer

WHAT IS "EQUITY"?

1

Recognition and remediation of the disproportionately high and adverse human or health or environmental impacts on low-income and communities of color.

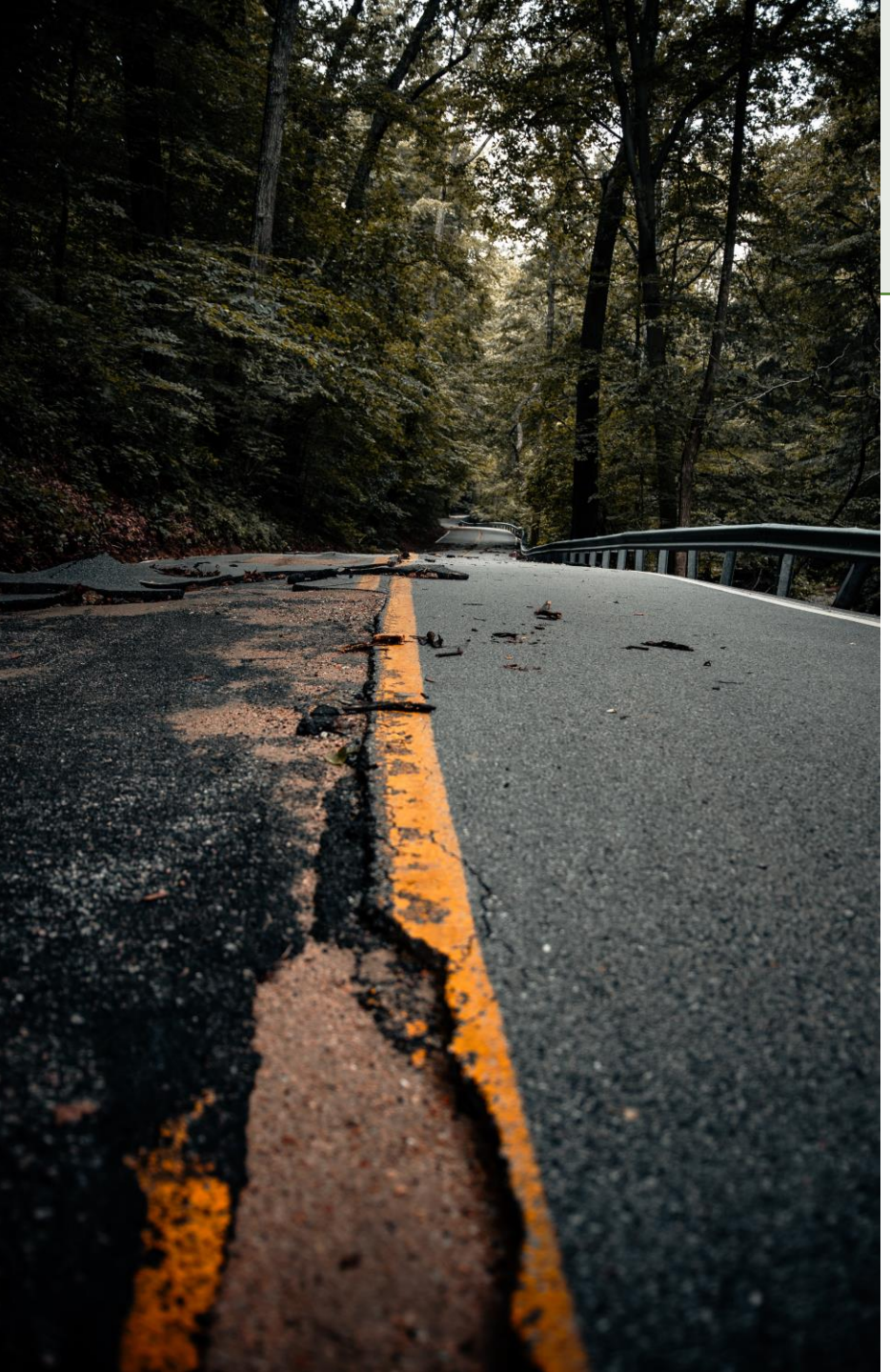
2

Achieving both **social and economic participation** in the energy system, while remediating social, economic and health burdens of those historically harmed by the energy system.

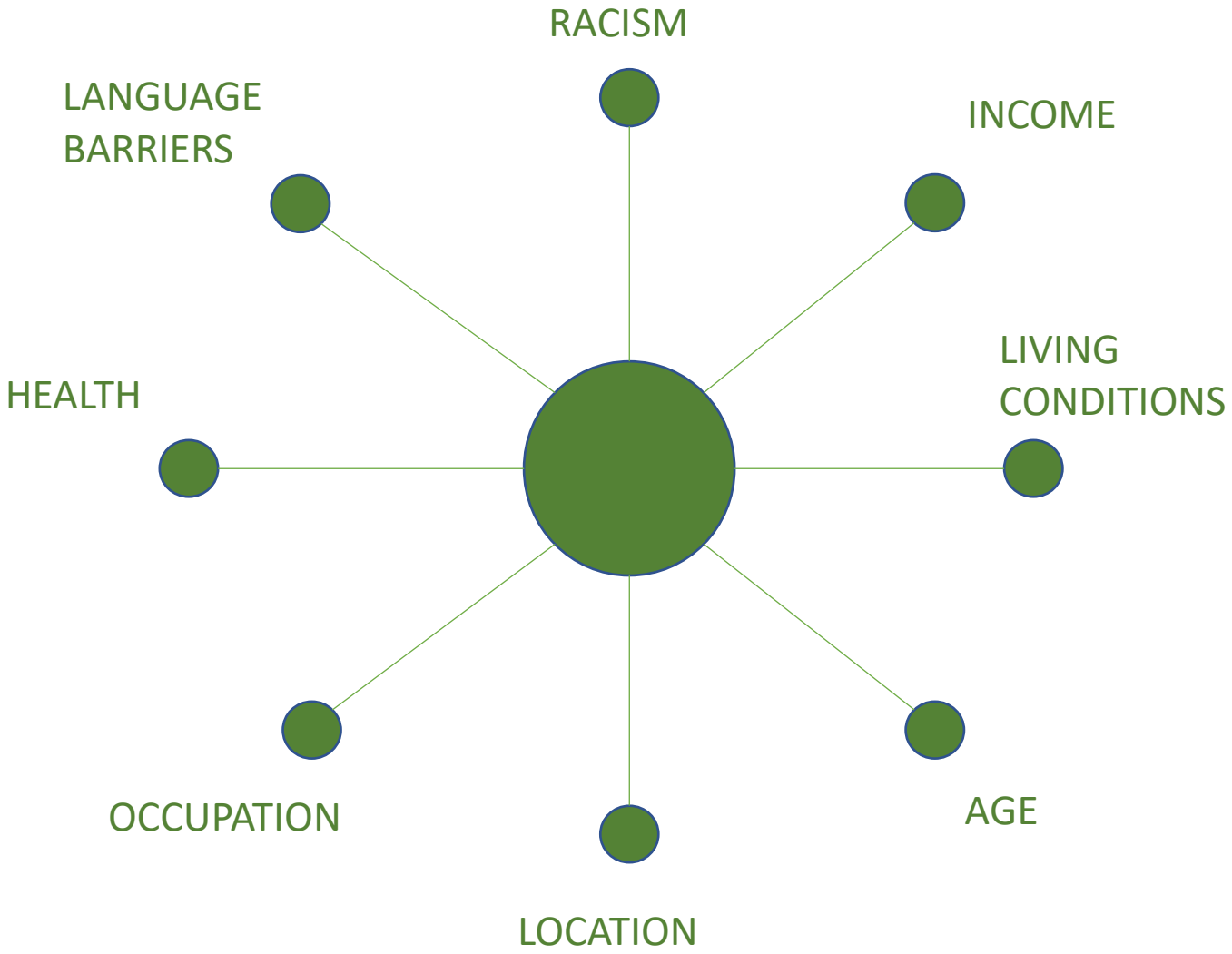
3

Remediation of the impacts of climate change on poor or underserved communities and **compensation for harms** suffered by such communities due to climate change.

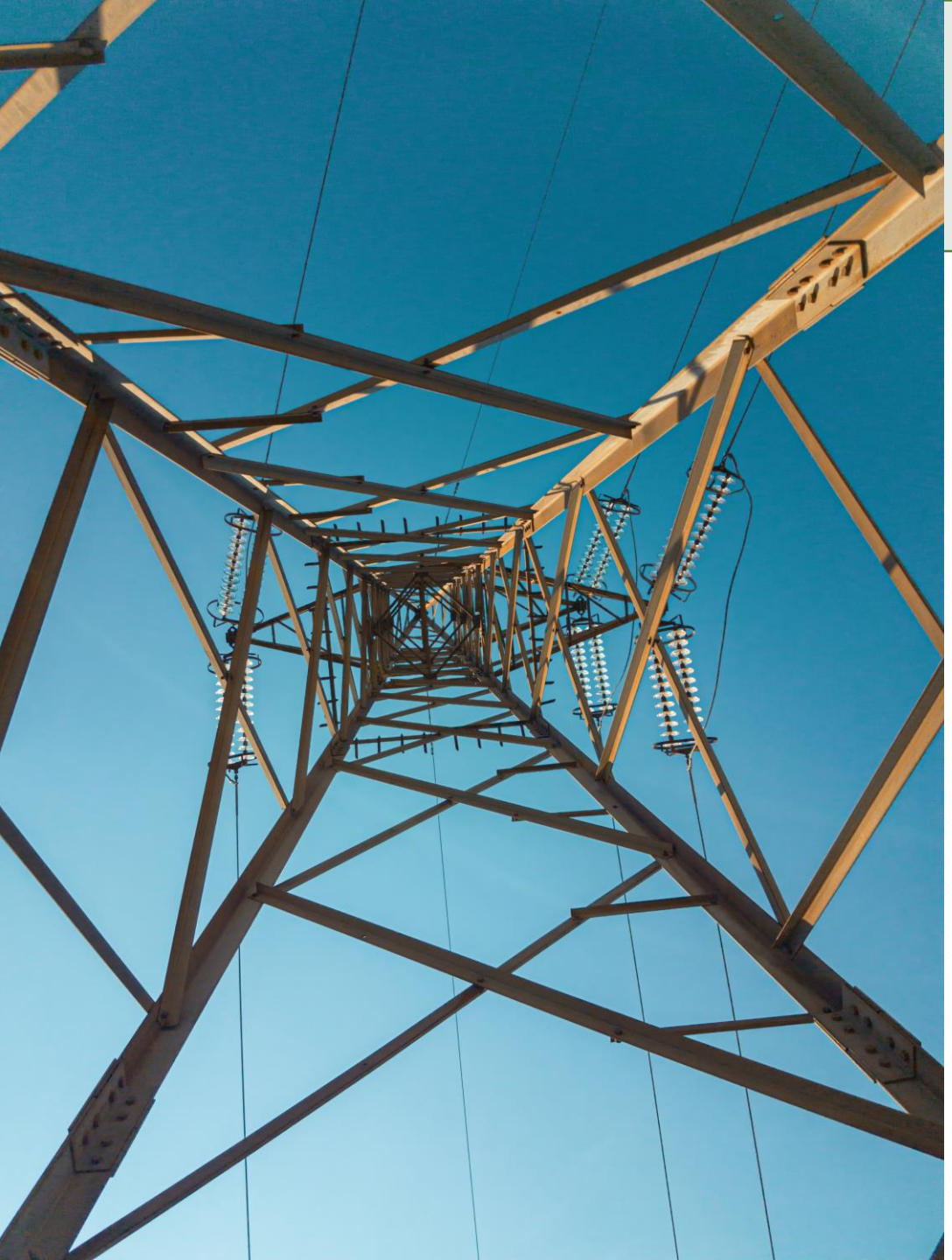
Source: Initiative for Energy Justice



FACTORS THAT CAN INCREASE CLIMATE VULNERABILITY



Source: Adapted from Bay Localize



EQUITY IN CONTEXT

Self-Generation Incentive Program

SGIP

- CPUC / PG&E, SCE, SoCalGas, CSE
- Upfront rebate for DERs, including renewable generation & storage technologies
- $1B in funding since program inception
- Early-stage mover in equity policy
- Iterative equity design process

EARLY STAGES

- First-come, first-served
- Priority for vulnerable geographic areas

EQUITY BUDGET (EB) – 2017 DAC GOALS

- Spur economic/workforce development
- Reduce conventional gas facilities
- ES access for low-income customers, nonprofits & public sector organizations

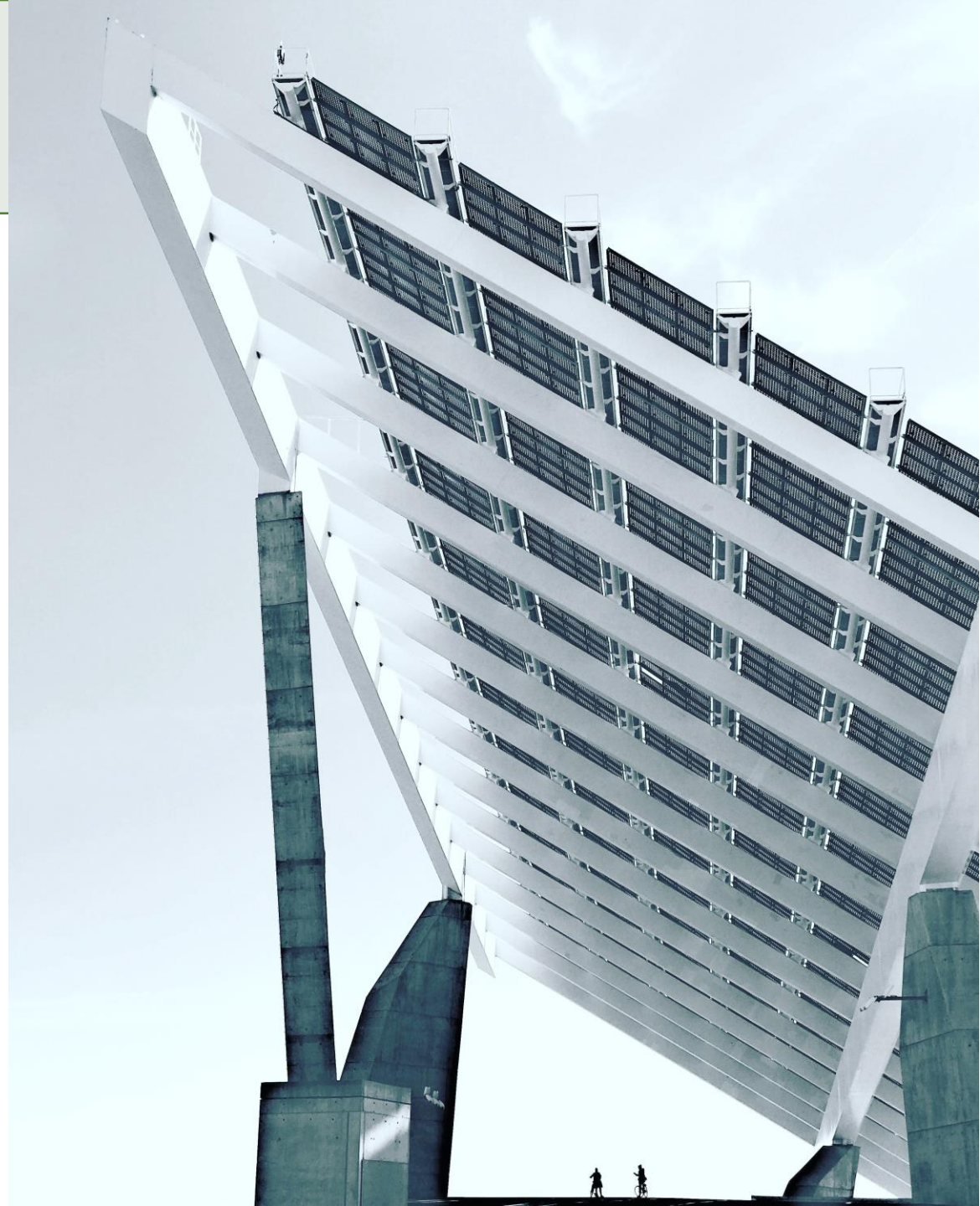
SGIP (cont'd)

EQUITY BUDGET ("EB")

- 25% funding for EB (~$55MM)
- Strict definitions for EB eligibility
- Covered some, not all costs
- 10% for single-/multi-family low-income housing
- By 2019, virtually zero applicants

EQUITY RESILIENCY BUDGET ("ERB")

- GOAL: Use untouched equity funding
- $100MM to ERB, $14MM to equity HPWH budget, $10MM to San Joaquin Valley pilot budget
- Most funding exhausted by P.A. due to:
  - Loosened low-income /DAC eligibility
  - High incentive rate
  - 100% equipment costs covered



SGIP (cont'd)

Challenges in Achieving Equity

TODAY

- ~100% funds reserved
- 90%+ *not* to CalEnviroScreen

MEET PEOPLE WHERE THEY ARE:

- Energy & Financial Literacy
- Housing & Development Constraints
- Social Perceptions (i.e., class)
- Money can't be central driver

WHAT IF…

- Designating seats at the table
- Accessible
- Intuitive
- Scope of Outreach
- Engagement Opportunities
- Rulemaking Process (i..e., language, time of day, duration of rulemaking clock, technology, comment process)

Source: SGIP Weekly Statewide Report, 08/02/2021

BUILDING EQUITY INTO POLICY DESIGN

	EQUITABLE POLICY DESIGN	HIGHLIGHTS & PRIORITIES
1	Ensure equitable access to economic benefits & opportunity by empowering communities.	Policy must be informed by local knowledge, meet local needs and be viewed as legitimate by the local community. Whenever possible, provide enhanced technical assistance to facilitate involvement of smaller communities, organizations, etc. System must have capacity to consult with and include communities and community members must have a seat at the table in designing programs and selecting projects.
2	Ensure universal & equitable access to remote affordable service options.	Expand efforts to develop affordable, quality broadband, including rural and under-resourced areas to enable access to information and engagement opportunities.
3	Center program design on reduction of energy cost burdens.	Reduce home energy and transportation costs for highly impacted populations by focusing on cost burden as a metric in planning.

Source: Washington State Department of Commerce

BUILDING EQUITY INTO POLICY DESIGN (cont'd)

	EQUITABLE POLICY DESIGN	HIGHLIGHTS & PRIORITIES
4	Incorporate health disparity metrics into energy planning.	Improve health and safety, safeguard against health and safety risks and improve access to the physical service and social conditions linked to health and well-being by operationalizing a health disparity metric in energy planning.
5	Increase resiliency & energy sovereignty for Tribes and energy independence for vulnerable communities.	Support the efforts of communities especially prone to instability from climate change and other natural disasters.
6	Address procedural inequities in program design and prioritize equitable development.	Perhaps the most significant equity-and-energy gains can be made through planning. The State has an opportunity to help guide clean and equitable programs and funding that support development.
7	Address nexus issues of affordable housing, livable communities & displacement in energy policy.	Work with housing policy experts to address unhoused and displaced communities through energy policy design, especially focused on cost burdens.

Source: Washington State Department of Commerce

EQUITY THROUGH ENVIRONMENTAL JUSTICE

PROCEDURAL EQUITY

- Create processes that are transparent, fair & inclusive in developing and implementing any program, plan or policy
- Ensure that all people are treated openly and fairly
- Increase civic engagement opportunities for communities that are disproportionately impacted by climate change

DISTRIBUTIONAL EQUITY

- Fairly distribute resources, benefits and burdens
- Prioritize resources for communities that experience the greatest inequities, disproportionate impacts, and have the greatest unmet needs

STRUCTURAL EQUITY

- Make a commitment to correct past harms & prevent future unintended consequences
- Address underlying structural / institutional systems that are the root causes of social and racial inequities

VCC's GUIDING PRINCIPLES FOR A JUST TRANSITION

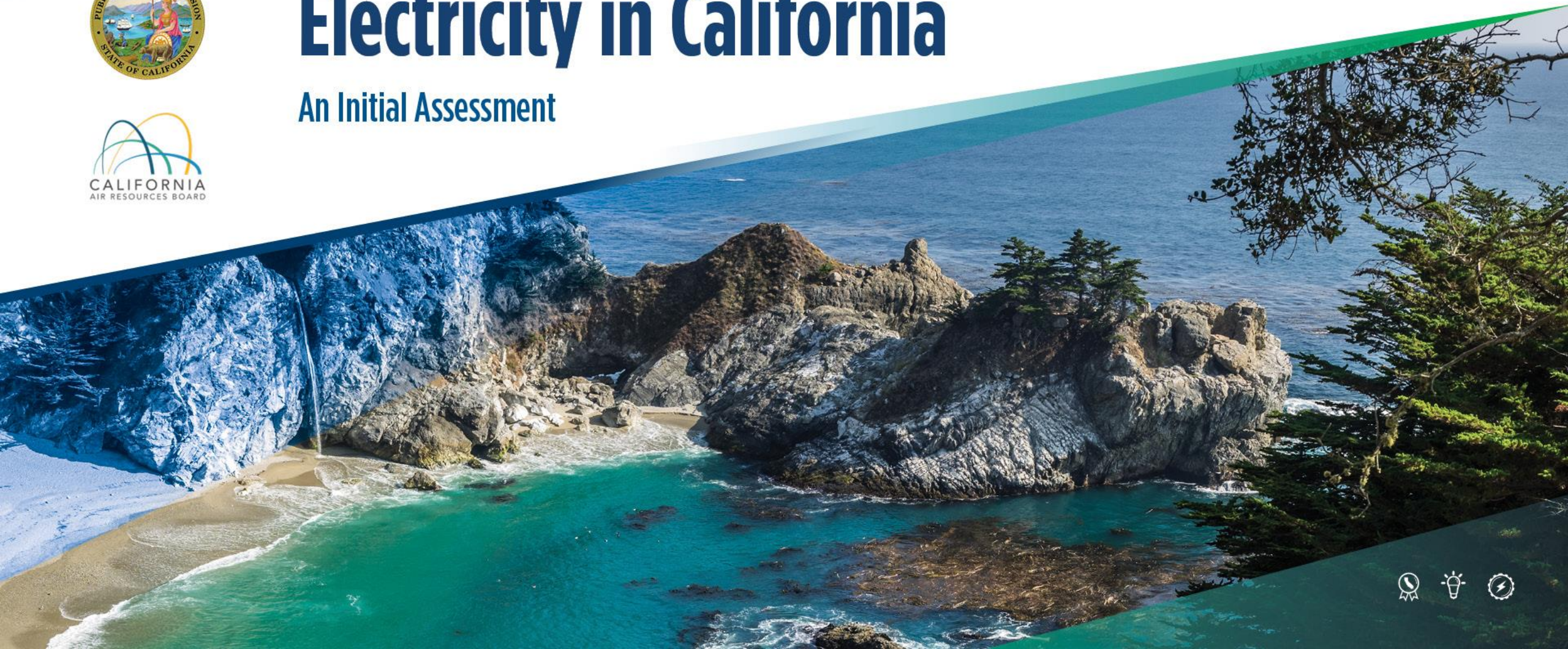
Source: Multnomah County/City of Portland Climate Action Plan

THANK YOU!

2021 SB 100 Joint Agency Report Summary

Achieving 100% Clean Electricity in California

An Initial Assessment



Senate Bill 100

Officially titled "The 100 Percent Clean Energy Act of 2018," Senate Bill 100 (SB 100, De León):

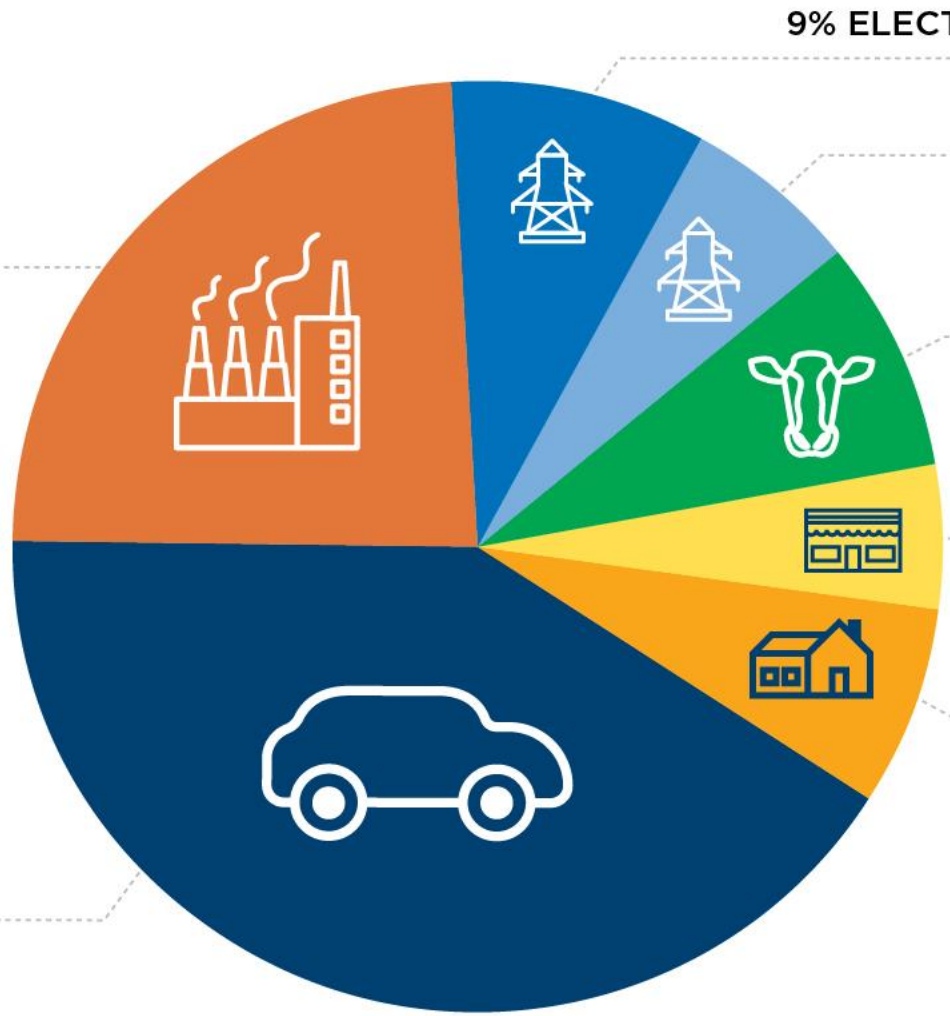
1. Sets a 2045 goal of powering all retail electricity sold in California and state agency electricity needs with renewable and zero-carbon resources.

2. Updates the state's Renewables Portfolio Standard to ensure that by 2030 at least 60 percent of California's electricity is renewable.

3. Requires the CEC, CPUC, and CARB to use programs under existing laws to achieve 100 percent clean electricity and issue a joint policy report on SB 100 by 2021 and every four years thereafter.

California's

2018 Greenhouse Gas Emissions



Source: California Air Resources Board

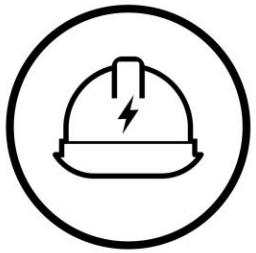
Benefits
of 100% Clean Energy

Improves Public Health

The phaseout of fossil fuel-generated electricity is expected to reduce criteria air pollution and related deaths and illnesses.

Advances Energy Equity

Disadvantaged communities—low-income neighborhoods that have historically suffered poor health, dirty air and other burdens — will reap the highest health benefits from clean electricity.



Restores and Creates Clean Energy Jobs

SB 100-driven growth will restore thousands of clean energy jobs lost during the pandemic and create thousands of new high-quality clean energy jobs.

The 2021 SB 100 Joint Agency Report

The 2021 report is a first step to evaluate the challenges and opportunities in implementing SB 100.

It includes an initial assessment of the additional energy resources and the resource building rates needed to achieve 100 percent clean electricity, along with the associated costs.

The estimates in this report will change over time as additional factors, such as system reliability, land use, energy equity, and workforce needs, are more closely examined.

Public Outreach

A diverse array of interests informed this report through a year-long series of public workshops and comment opportunities. Participants included:

- Community leaders
- Energy experts with utilities, technology companies and trade groups
- University researchers
- Environmental groups
- Environmental justice organizations

The joint agencies also consulted with:

- The California Balancing Authorities
- The Disadvantaged Communities Advisory Group

Renewable/Zero-Carbon Technologies Modeled:

- Solar, photovoltaic and thermal (existing only)
- Wind, onshore and offshore
- Geothermal
- Bioenergy
- Fuels cells
- Hydroelectric, existing large and small operations only
- Nuclear, existing power plants only

California

Clean Electricity Resources

Projected to increase annual costs 6% above a 60% RPS baseline

* Includes in-state

** Includes in-state and out of state capacity

† New hydro and nuclear resources were not candidate technologies for this round of modeling and could not be selected

	Existing Resources	Projected New Resources	
	2019*	2030**	2045**
Solar (Utility-Scale)	12.5 GW	16.9 GW	69.4 GW
Solar (Customer)	8.0 GW	12.5 GW	28.2 GW
Storage (Battery)	0.2 GW	9.5 GW	48.8 GW
Storage (Long Duration)	3.7 GW	0.9 GW	4.0 GW
Wind (Onshore)	6.0 GW	8.2 GW	12.6 GW
Wind (Offshore)	0 GW	0 GW	10.0 GW
Geothermal	2.7 GW	0 GW	0.1 GW
Biomass	1.3 GW	0 GW	0 GW
Hydrogen Fuel Cells	0 GW	0 GW	0 GW
Hydro (Large)	12.3 GW	N/A†	N/A†
Hydro (Small)	1.8 GW	N/A†	N/A†
Nuclear	2.4 GW	N/A†	N/A†

Achieving 100% Clean Electricity in California

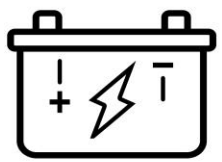
To Achieve Clean Energy

Development Needs To Rapidly Accelerate

Solar & Wind

3X

Solar and wind build rates need to nearly triple*



Battery

8X

Battery storage build rates need to increase by nearly eightfold**

*Based on 10-year average | **Based on 2020

Additional Scenarios:
Preliminary Findings

Study Scenarios

The agencies also explored scenarios outside their interpretation of SB 100 to inform broader state planning efforts

High Demand Flexibility:
Increased flexibility may lower overall resource needs and systems costs

No-Combustion:
Reduces criteria air pollution but results in higher costs

Zero-Carbon Firm Resources:
Commercialization of emerging technologies or cost decreases in existing firm resources may lower overall system costs

Accelerated Timeline:
These targets may be achievable but may increase overall costs

Key Takeaways from Modeling

This initial analysis suggests SB 100 is technically achievable through multiple pathways.

Construction of clean electricity generation and storage facilities must be sustained at record-setting rates.

Diversity in energy resources and technologies lowers overall costs.

Retaining some natural gas power capacity may minimize costs while ensuring uninterrupted power supply during the transition to 100 percent clean energy.

Increased energy storage and advancements in zero-carbon technologies can reduce natural gas capacity needs.

Further analysis is needed.

Recommendations for Further Analysis

1. Verify that scenario results satisfy the state's grid reliability requirements.
2. Continue to evaluate the potential effects of emerging resources, such as offshore wind, long-duration energy storage, green hydrogen technologies, and demand flexibility.
3. Assess environmental, social, and economic costs and benefits of the additional clean electricity generation capacity and storage needed to implement SB 100.
4. Hold annual workshops to support alignment among the joint agencies and continuity between SB 100 reports.

SB 100 Implementation Activities

- Transmission Planning: Presenting land use maps to inform resource locations and long-term transmission needs.
- Gas Plant Retirements: 14% around 2040 in core scenario
- Engagement with EJ groups.

Land Use Considerations

- Landscape-scale planning can help identify opportunities for development while reducing adverse effects
- Consider tradeoffs, including carbon sequestration by natural and working lands

Social Costs and Non-Energy Benefits

Stakeholders recommended the joint agencies integrate at least the following into SB 100 planning:

- Land Use Impacts
- Public Health and Air Quality
- Water Supply and Quality
- Economic Impacts
- Resilience

Thank you!

Aleecia Gutierrez
Deputy Director, Energy Assessments Division
California Energy Commission
Aleecia.Gutierrez@energy.ca.gov

California's
Climate Imparative

BY 2100

AVERAGE ANNUAL MAXIMUM DAILY TEMPERATURE

IS PROJECTED TO INCREASE BY

5.6–8.8°F

Depending on greenhouse gas emissions reductions. The greatest increase is seen with business-as-usual emissions levels.

Source: California's Fourth Climate Change Assessment

California's Climate Imperative

More Acres Burned From Wildfires in 2020 Than the Last Four Years Combined

2016–'19

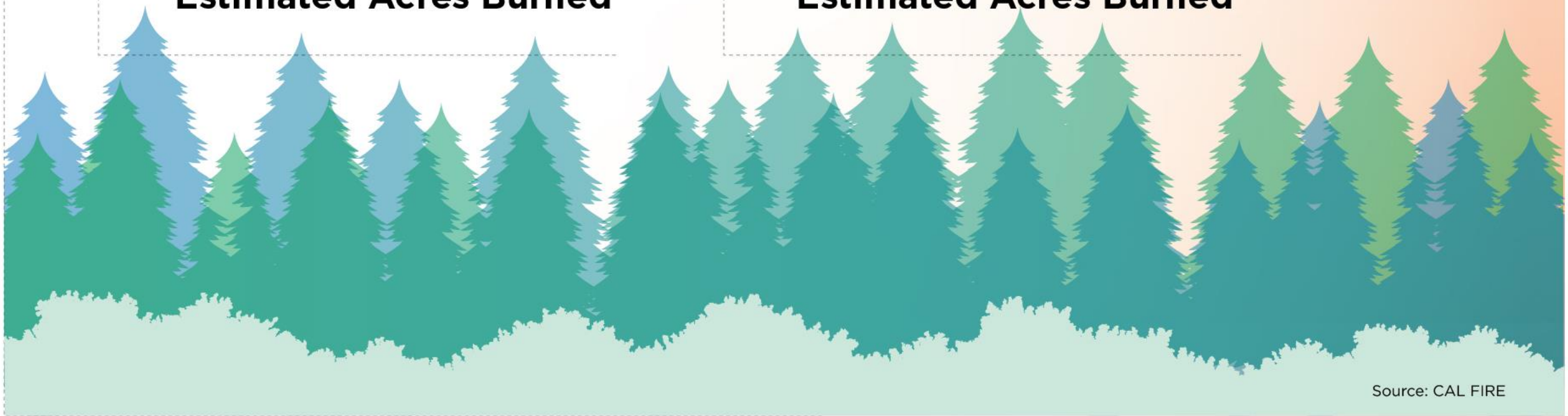
3.7 MILLION

Estimated Acres Burned

2020

4.2 MILLION

Estimated Acres Burned



Source: CAL FIRE

California's
Clean Electricity Goals

2020

33%

2030

60%

Under the Renewables Portfolio Standard, eligible resources include solar, wind, geothermal, biomass and small hydroelectric.

2045

100%

Under SB 100 which expands eligibility to include additional carbon-free resources

In 2019,

63%

of California's electricity retail sales came from non-fossil fuel sources:

RENEWABLES

HYDROELECTRIC

NUCLEAR

Continuing a Legacy of Bold Leadership

Carbon emissions from generating electricity have dropped 43 percent since 1990, and in 2017, for the first time ever, the state drew most of its power from carbon-free sources. These gains are largely attributable to:

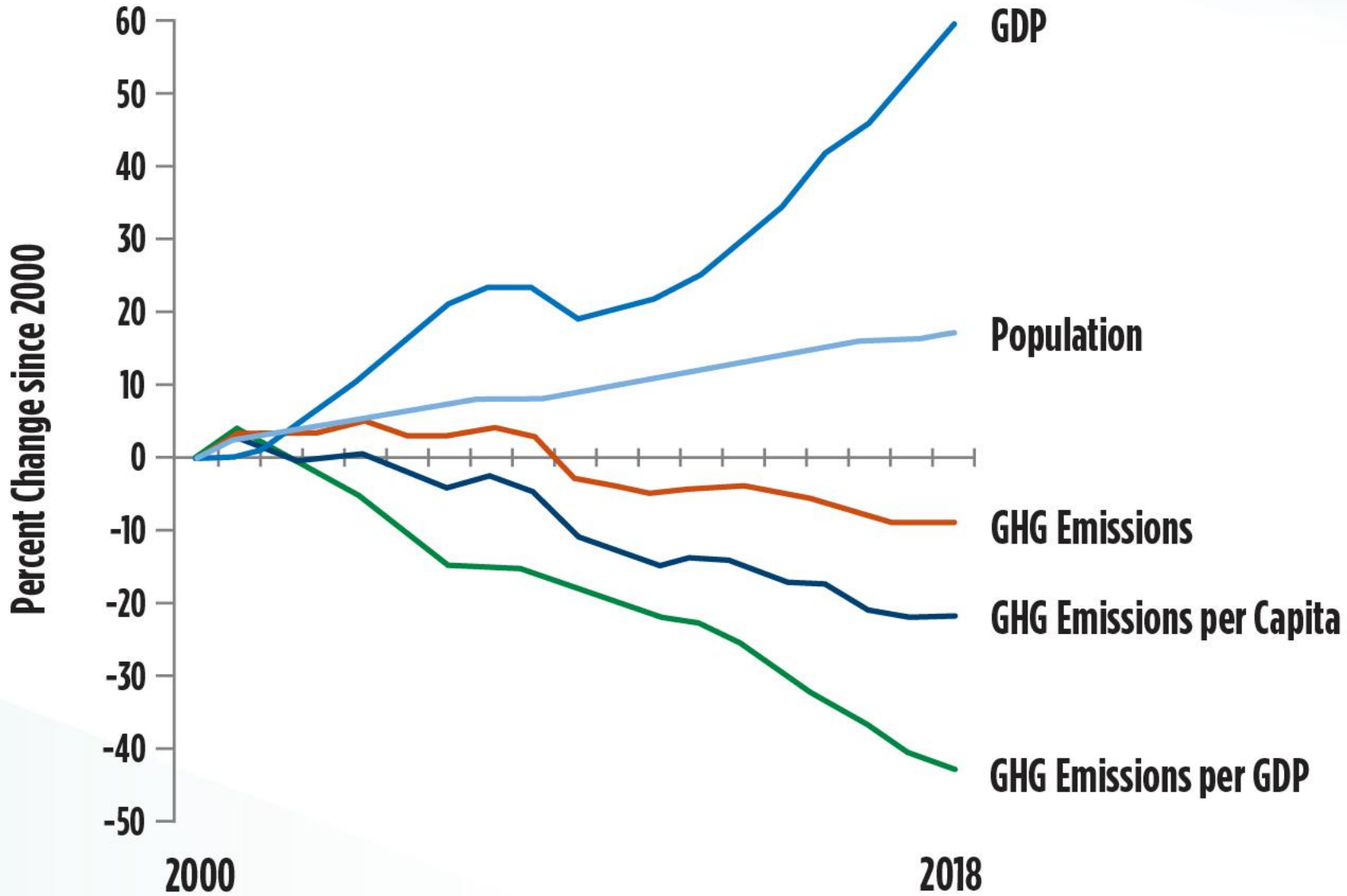
California's energy efficiency standards for buildings and appliances

The state's Renewables Portfolio Standard

Greatly reduced use of coal-fired power plants

Statewide Trends

of Emissions
and Indicators
(2000–2018)



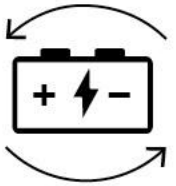
Source: California Air Resources Board

Related Clean Energy Efforts

Transportation electrification
California is moving toward having 100 percent of new cars and passenger trucks sold in the state be zero-emission by 2035, powered by increasingly clean electricity.

Energy efficiency
Improved energy efficiency will reduce the economic and environmental costs of expanding California's clean electricity generating capacity.

Building decarbonization
Electrifying more building energy uses is environmentally more effective if the power comes from zero-carbon sources.



Load flexibility
Increased load flexibility is critical to maintaining a reliable power supply at a low cost.

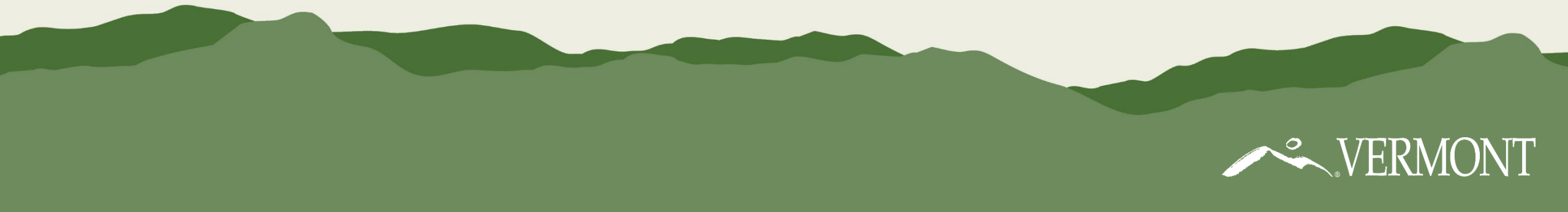
Questions or Comments?

- Type your questions in the chat, “raise your hand” to be called on and ask your question verbally (or request to do this in the chat if you don’t have that functionality), or press *6 when telephone callers are invited to ask questions.

VERMONT

BREAK

We will reconvene at 12:05pm!



Session II

Design Considerations for 100% Renewable Energy Standard in Vermont

VERMONT

Workshop Objectives

Gather input on electric sector policies, programs, and strategies currently in place or that should be in place with an eye toward:

Trade-offs made when assessing policy options and the basis for those trade-offs

- What decision-making criteria should be used to make such trade-offs?
- How should these criteria be employed in the context of making choices regarding the State's energy future?

Strategies, policies, and programs that are (or are not) working to meet renewable energy and climate goals in the electric sector?

- Recommendations regarding alternatives to consider (ex. Climate Council policy drafts)
- How to address equity in the sector/what is currently being done and/or planned to address
- Strategies and options for regions and municipalities to employ

Proposed Policy Recommendations & Considerations

Liz Miller, Electric Sector Task Lead, Cross-Sector Mitigation Subcommittee

VERMONT

First, some context

- The current Renewable Energy Standard (RES) requires Vermont DUs to retire RECs to meet its requirements.
  - Tier I: 55% of retail sales in 2017, increasing to 75% in 2032 to be met with any renewable resource that can deliver energy to New England
  - Tier II: 1% of retail sales in 2017, increasing to 10% in 2032 to be met with distributed generation that is less than 5 MW, interconnected to a Vermont utility and came online after June 30, 2015
  - Tier III: Energy Transformation that requires fossil-fuel reductions equivalent to 2% of retail sales in 2017, to 12% by 2032

- Electric sector is necessary to enable decarbonization of other sectors
  - Timing of load will change – more winter-time load
  - Flexible load management is critical to controlling costs and optimizing benefits
  - It is also critical to ensure affordability of electricity to help encourage decarbonization and to elevate the need to ensure equitable access to programs

- Regional generation fleet changing
  - Significant amounts of offshore wind and solar will be built
  - This will change regional “system” fuel mix and help decarbonization, once it happens
  - And/but: Increased amounts of infrastructure will be necessary
  - Wholesale electricity market structures will need to change, with ancillary services becoming increasingly important
  - Single hour capacity and transmission planning likely to shift to probabilistic analysis to match new resources and system

100% RES requirement as a path to ensure deeper decarbonization…?

- Existing overall Renewable Energy Standard reaches 75% by 2032
- Percentage requirements ensure increased load from electric vehicles, heat pumps, etc., are captured as electrification takes hold
- Shifting to 100% is a policy that could ensure deeper decarbonization as electrification happens. Some utilities have announced their own 100% goals or already achieved this percentage
- …Design determines the costs and benefits of increasing to 100%

Structure of a 100% RES – Policy Issues

- Local/Regional/Supply Type: In-state requirements; level from resources delivered into New England grid; diversity of supply considerations
- New/Exisiting: Supporting continued operation of existing renewables here and regionally while ensuring significant, new resources are built cost effectively to support decarbonization and other state economic goals
- Measurement period: Annual, as now, or eventually seasonal or daily? Subcategory to ensure some resources deliver in period of load need (winter, e.g.)?
- Vintage: What year counts as “new” – what to do about SPEED projects, e.g.?
- How to be mindful of costs to ensure electrification is cost competitive – different designs can have significantly different customer costs and also different benefits
- Renewable or Carbon Free, and what definition? Science & Data subcommittee of Climate Council and technical consultant examining GHG inventory and relevant issues associated with what constitutes renewable power sources

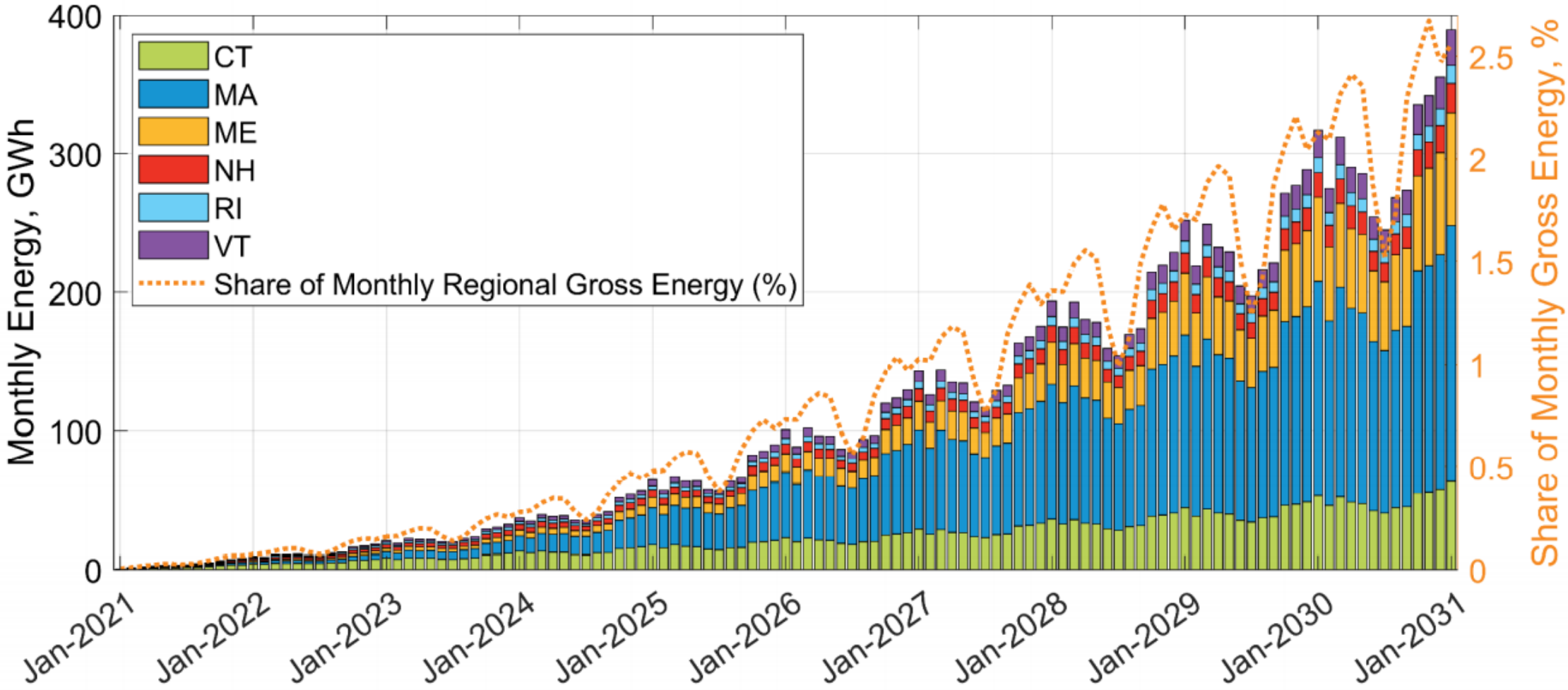
Acquiring Resources for Timing Needs:

- Timing of load in an electrified world will shift from status quo (see next slides)
- Could identify time period where resources are most valuable
  - E.g., November 15- March 1; 4pm-10pm
- Could create a subtier within RES requiring resource acquisition (most flexible), or
- Could create a payment model to encourage participation
  - Resource delivered during that time would receive adder (higher value REC/RES credit or X cent per kwh, e.g.)
- Eligible resources could be storage; renewables with possibility of delivery shape (wind, hydro); demand reduction; etc.
- Could lead to value for weatherization for homes with heat pumps and other products
  - Reflecting reduction in electric usage during peak period

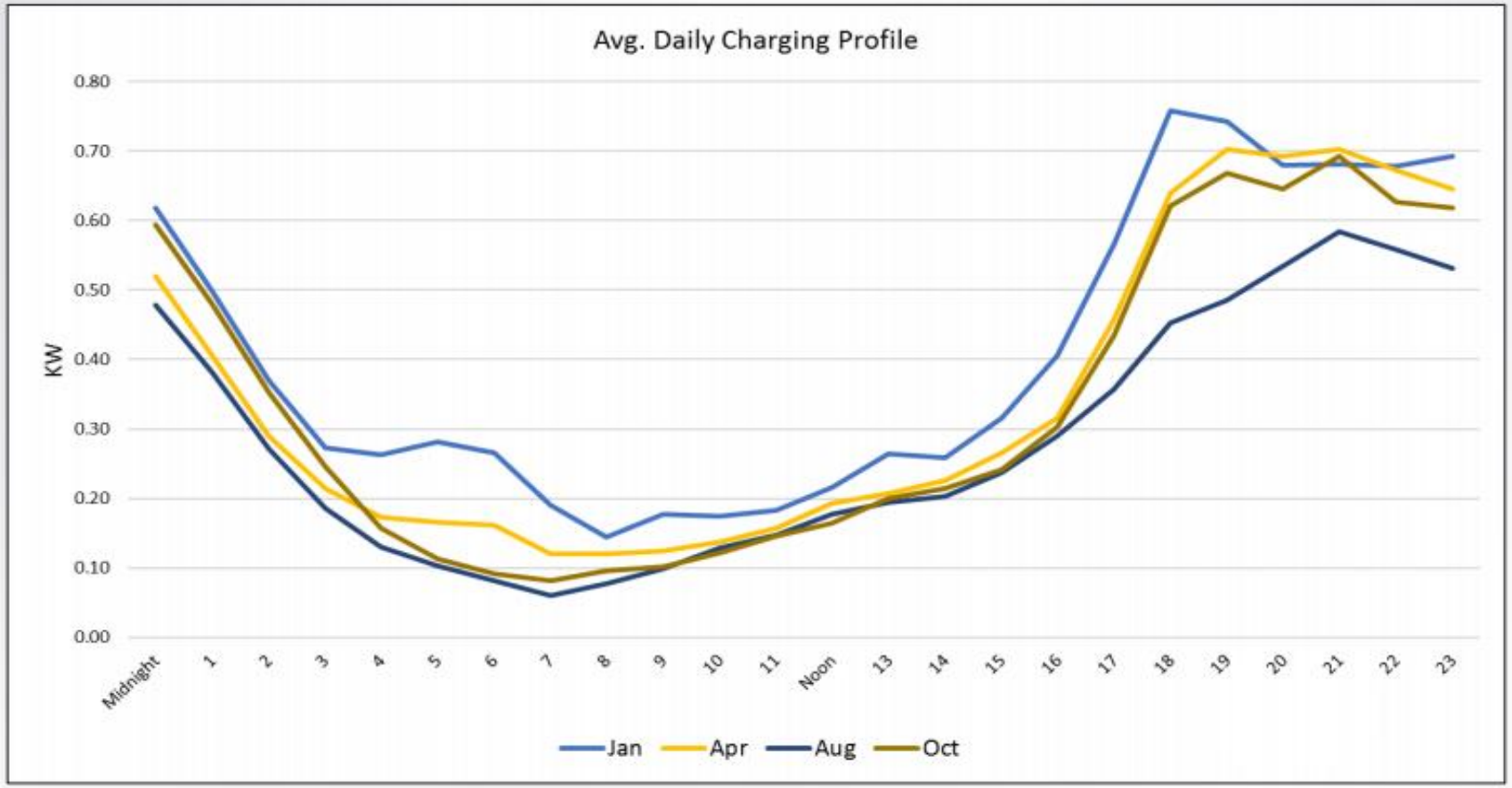
Final 2021 Transportation Electrification Forecast

Monthly Energy

Source: ISO-NE 2021 Final Transportation Electrification Forecast, at slide 12.
evf2021_forecast.pdf (iso-ne.com)



AVERAGE DAILY CHARGING PROFILE



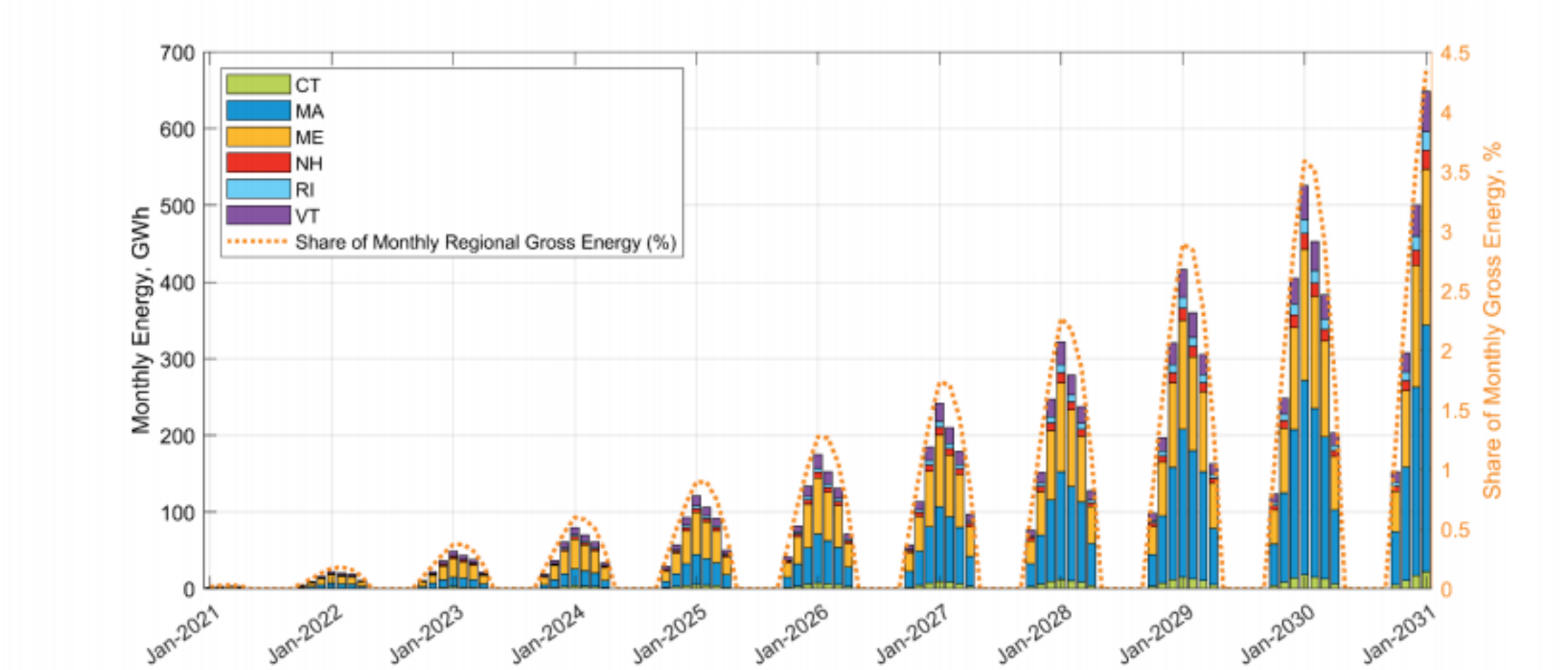
- On average a January charging day consumes 40% more electricity than August.
- January peak charging hour is 6pm, whereas August is 9pm.

Vermont System Planning Committee, 2020 Long-Term System Load Forecast Year at slide 29.
[Demand Response Forecasting and Analysis (vermontspc.com)]

Final 2021 Heating Electrification Forecast

Monthly Energy, GWh

Source: ISO-NE Final 2021 Heating Electrification Forecast, at slide 14.
lfc2021_final_heating_elec.pdf (iso-ne.com)



Clarifying questions?

- Type your questions in the chat, “raise your hand” to be called on and ask your question verbally (or request to do this in the chat if you don’t have that functionality), or press *6 when telephone callers are invited to ask questions.

Group Discussion

1. What are the key design parameters/considerations/issues when designing a 100% RES policy?
2. When assessing each design parameter, what criteria should be used to make decisions between choices?
3. What key issues can/should be addressed in a RES and what should be addressed with supporting policies or programs (e.g., changes to existing programs or new tools for renewable energy deployment)?

Creating A Clean, Affordable, Equitable and Resilient Energy Future For the Commonwealth

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENERGY RESOURCES
Patrick Woodcock, Commissioner

Massachusetts Clean Electricity Policy

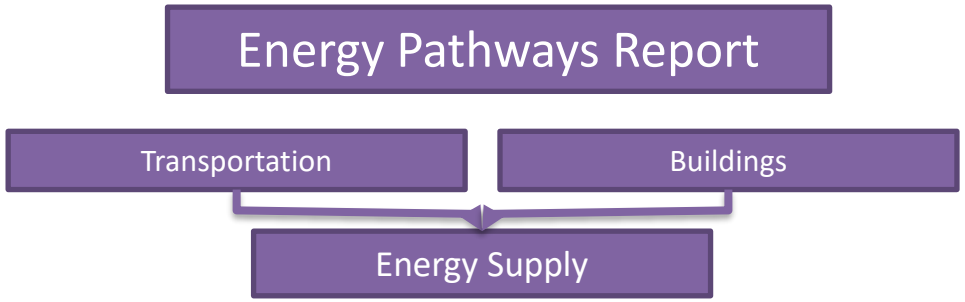
August 10, 2021

DOER
Massachusetts Department of Energy Resources

2050 Decarbonization Roadmap

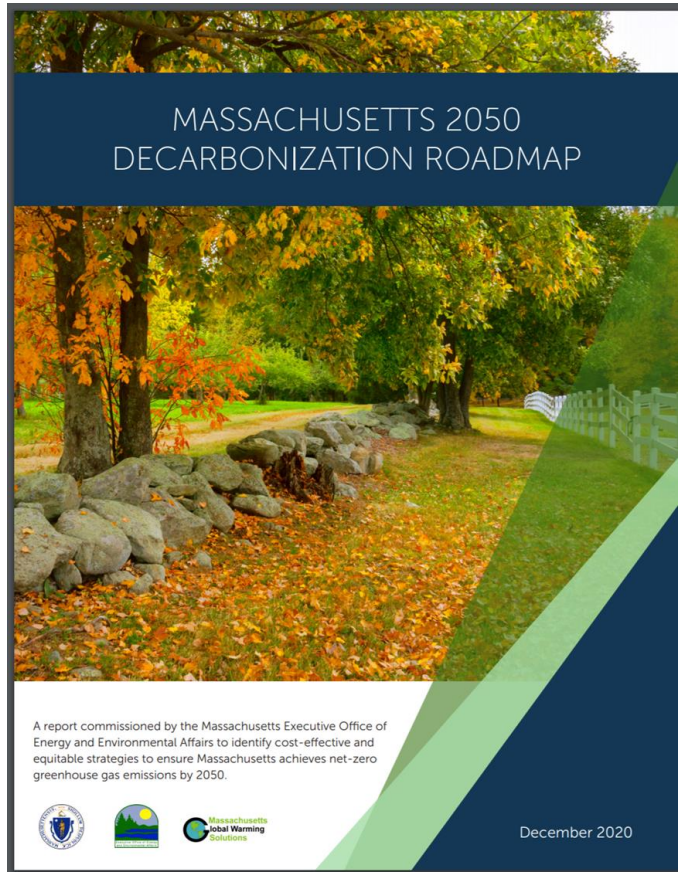
Goals

- Provide the Commonwealth a comprehensive understanding of strategies and transition using best available science and research methodologies
- Understand tradeoffs across pathways
- Inform 2030 emissions limit



Scenarios

All Options	Limited Offshore Wind	Limited Efficiency	Pipeline Gas
100% Renewable Primary Energy	No Thermal	Regional Coordination	Distributed Energy Resources Breakthrough



Roadmap Key Take-Aways

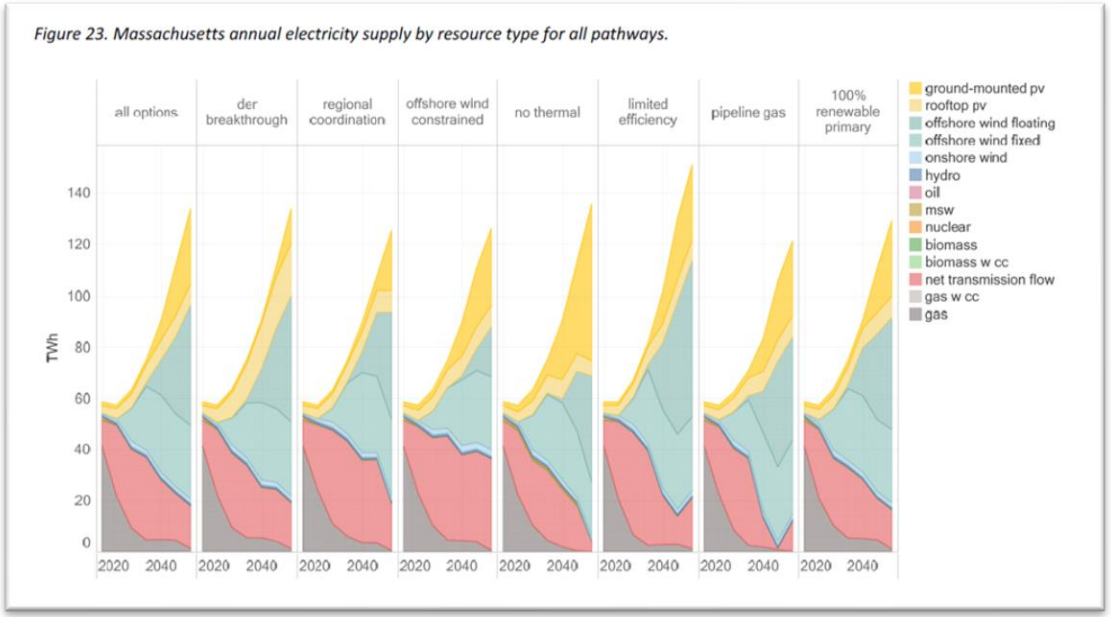
- Decarbonization requires a comprehensive plan focused on a ***rapid deployment of renewables***—
  - the siting and construction of offshore wind and ground-mounted solar generation at scale,
  - reliable balancing, and
  - planning for limited land and bioenergy resources.
- Meeting Net Zero Target will require a ***transformation of energy systems*** with impacts to energy flows, demand and supply, and costs
- Coordination across the Northeast will be necessary to transition to a clean, affordable, and reliable low-carbon, 21st century grid, including system planning and development of new markets by the grid operation

Near term emissions reductions come primarily from increasing efficiency, continuing to build-out solar PV, and importing low-carbon electricity from out-of-state

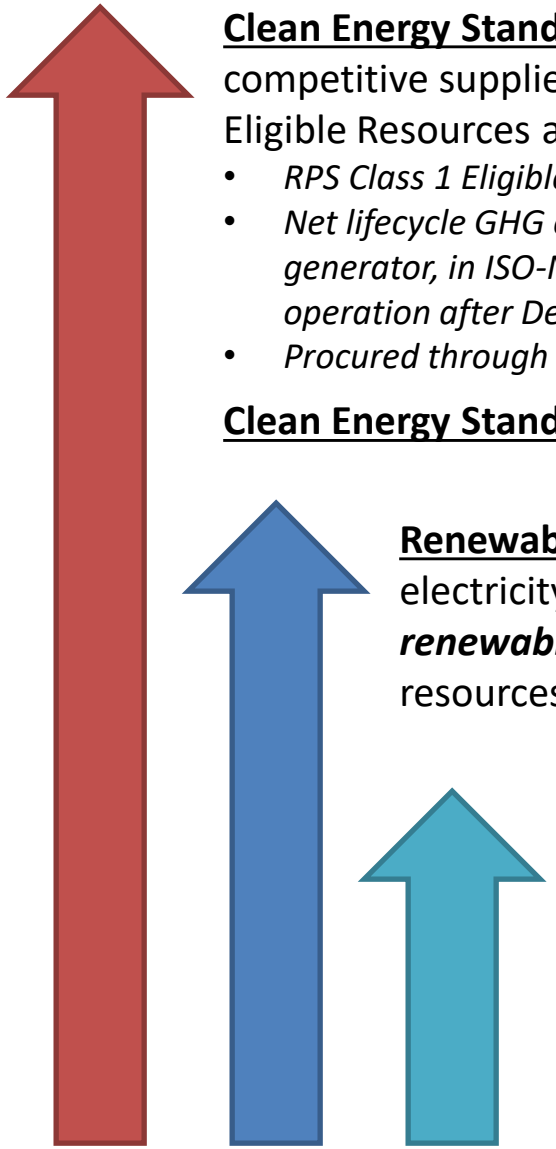
medium term, further reductions come primarily from building offshore wind and achieving high levels of electrification

long term, the decarbonization of remaining fuel uses

Figure 23. Massachusetts annual electricity supply by resource type for all pathways.



Energy Standards in Massachusetts



Clean Energy Standard: Sets a minimum percentage of electricity sales that utilities and competitive suppliers must procure from ***clean energy sources***
Eligible Resources are either:

- *RPS Class 1 Eligible*
- *Net lifecycle GHG emissions of at least 50% below those from the most efficient natural gas generator, in ISO-NE or have new transmission capacity, and have commenced commercial operation after December 31, 2010.*
- *Procured through Section 83D Clean Energy Procurement*

Clean Energy Standard - Existing: Eligible resources include clean energy generation pre-2010

Renewable Energy Portfolio Standard: Sets a minimum percentage of electricity sales that utilities and competitive suppliers must procure from ***renewable energy sources.*** Includes classes and carve-out for qualifying resources such as existing resources and solar PV

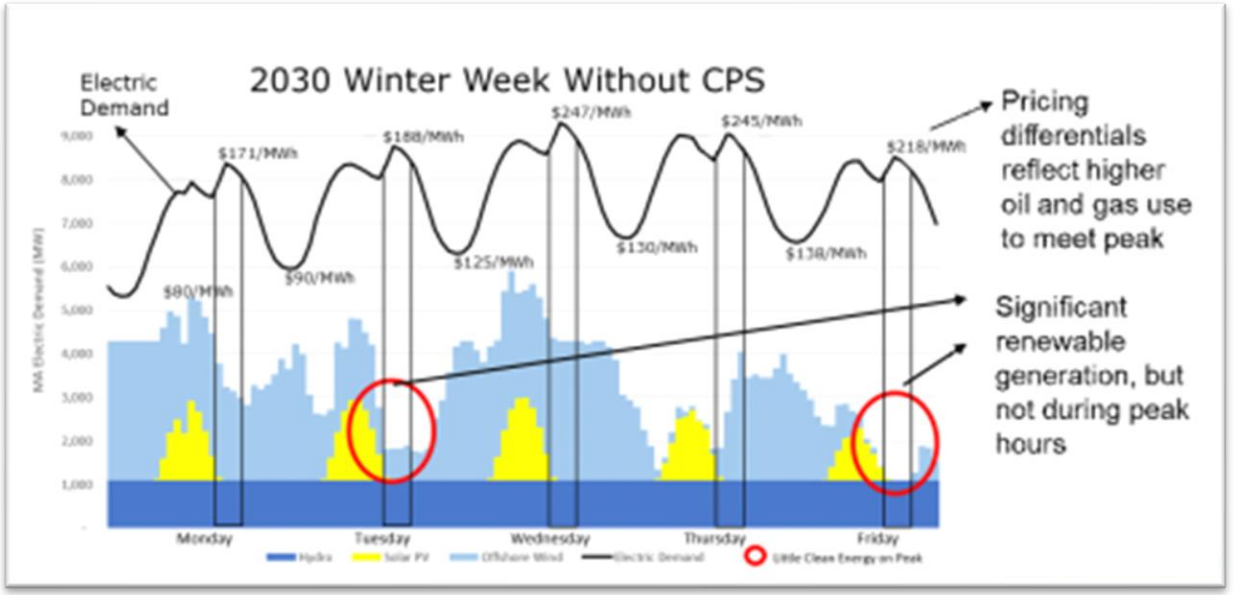
Clean Peak Standard: designed to provide incentives to clean energy technologies that can supply electricity or reduce demand during seasonal peak demand periods established by DOER.

Solar Massachusetts Renewable Target (SMART) Program

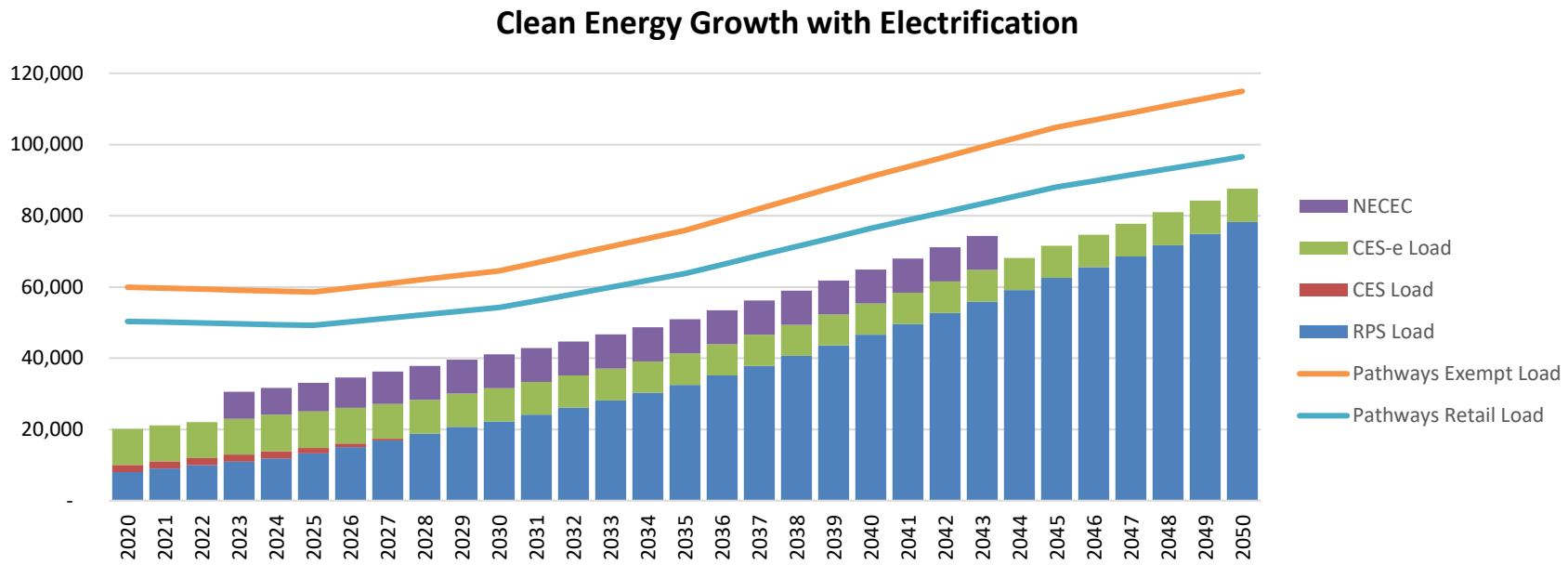
- Chapter 75 of the Acts of 2016- directed DOER to create a new solar incentive program to replace the Solar Carve-out II Program (SREC II)
- SMART launched on November 26, 2018
  - Initially 1,600MW but was expanded to 3,200MW in 2020
- Voluntary declining block tariff program that provides fixed Base Compensation Rates to qualified facilities (i.e. Solar Tariff Generation Units)
  - 10-year term for facilities less than or equal to 25 kW AC
  - 20-year term for facilities larger than 25 kW AC
- Program design steers projects towards optimal locations by providing **Location Based Adders** and **Greenfield Subtractors**
  - A Greenfield Subtractor is applied to the Base Compensation Rate of any facility sited on open space that does not meet the criteria to receive the full incentive
- Supports innovation
  - Energy storage required for projects over 500kw
  - Dual agriculture solar
  - Low Income Community Shared Solar
  - Floating solar

Clean Peak Standard

- **Background**
  - Market incentive for clean energy – storage, renewables, demand response – during times when costs and emissions are at their highest
  - Creates an annual requirement on all electricity suppliers to purchase a certain amount of Clean Energy Certificates (CPECs)
- **Program Progress**
  - CPS Regulations (225 CMR 21.00) launched in 2020
  - 37 MW of resources participated, including energy storage, wind, solar, and anaerobic digestors
  - 9.5 MW received the Resilience Multiplier, a 50% increase in program value for resources which provide renewable backup power
- **Procurement**
  - Clean Peak ES growth is expected following EDC issuance of RFP for CPEC Procurement
  - Targeting late 2021 for first RFP, then twice-annually thereafter

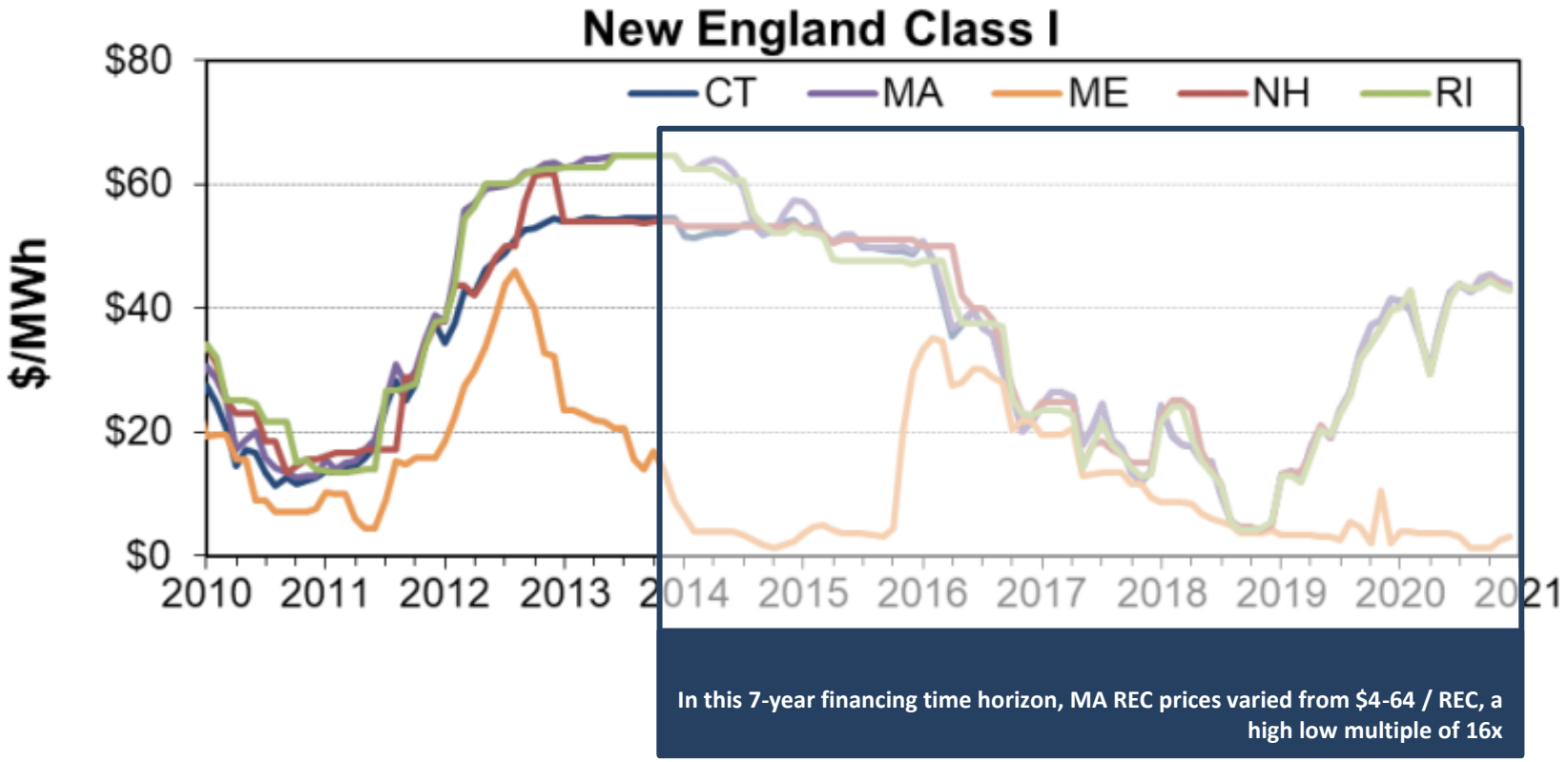


Energy Standards in Massachusetts



- Recent legislation increased the annual RPS obligation increase to 3% until 2030, where it will increase 2% annually, reaching 81% of retail electric load in 2050
- The CES is set in regulation as 80% in 2050
  - *Massachusetts Department of Environmental protection sought stakeholder comment on whether to increase the CES obligation to not be taken over by the increased RPS as part of 2021 regulatory review*
- Approximately 14% of electric load in Massachusetts is wholesale or exempt load and is not subject to the CES and RPS
  - *Recent legislation included new program requirements for municipal light plants to report and meet emission limits*
- It is anticipated that clean energy policy incentivizing electrification will significantly increase electric load and therefore the RPS and CES obligation in terms of MWh

Financing a Clean Energy Project



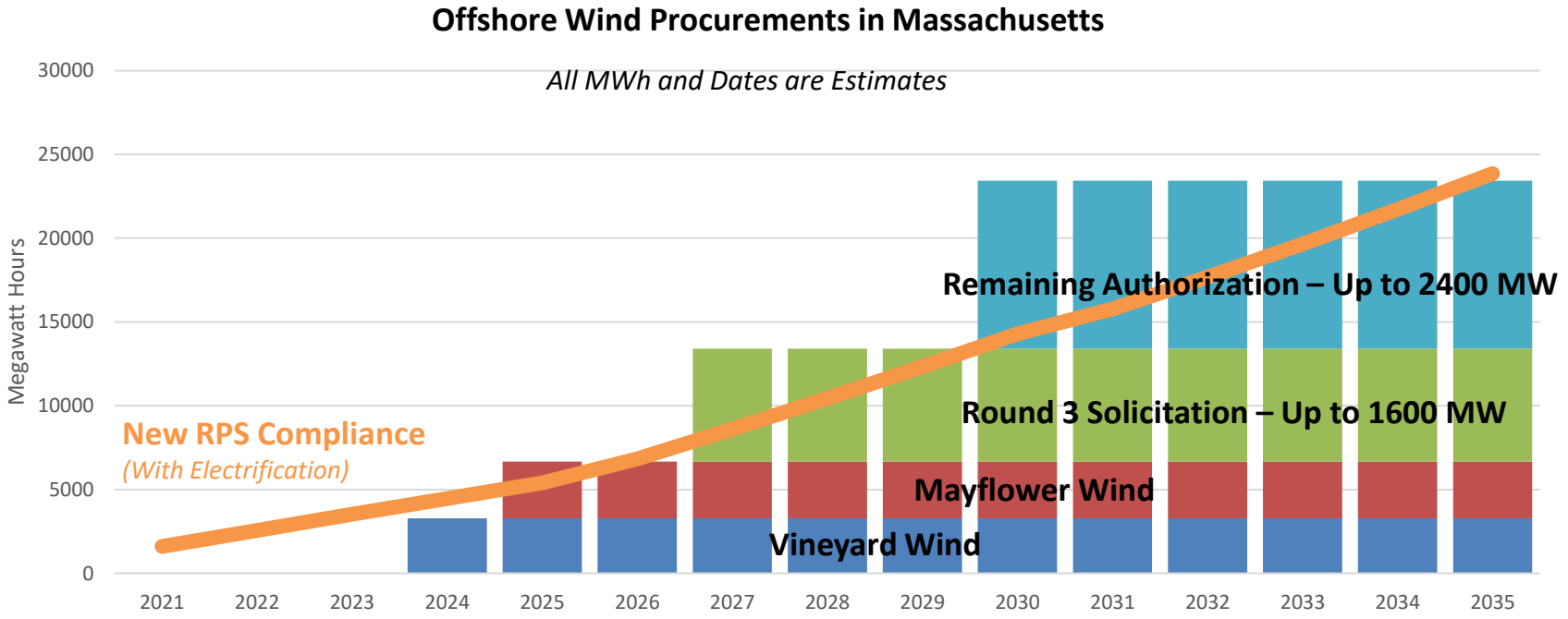
- Volatility has undermined project's ability to use RPS market as a means to finance projects.
- The SMART solar PV tariff, and clean energy procurements, including for offshore wind energy are necessary to have a financeable product.

DOER
Massachusetts Department of Energy Resources

Green Communities Act Procurements

Clean Energy Procurements

- Section 83 (2010) → *Cape Wind*
- Section 83A Multistate RFP (2014) → *Solar and On-shore Wind Projects*
- Section 83D (2016) → *NECEC Hydro project*
- Section 83C, Rounds 1-3 (2016, 2018, 2021) → *Offshore Wind Projects*



DOER
Massachusetts Department of Energy Resources

Limitations of Current Procurement Model

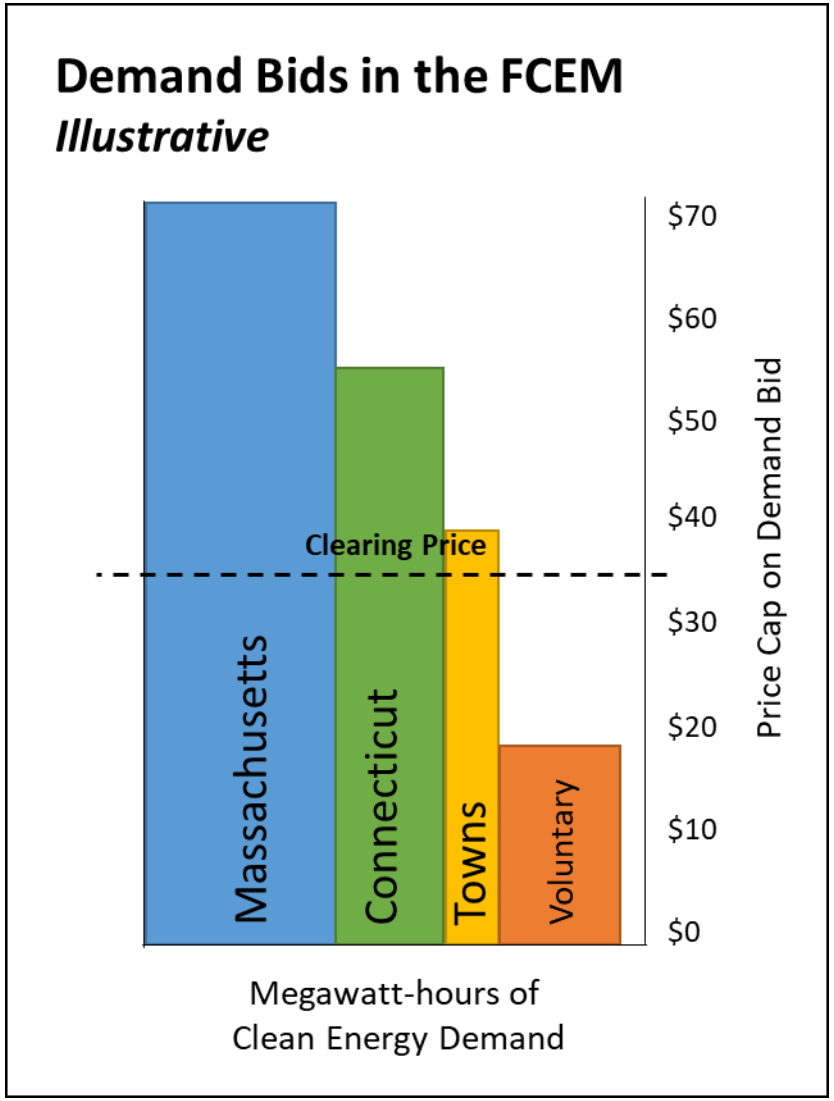
1. **Lack of Regional Coordination.** Multiple Electric company coordination with other states is unmanageable.
2. **Unpredictability.** The procurement process in MA and other states make it hard for developers to plan their businesses.
3. **Lack of Scalability.** While scale has increased, the current process would be challenged to deliver the 1GW per year that our decarbonization laws may require.
4. **Ratepayer Risk.** 20-year contracts are inherently risky.
5. **Long Procurement Process.** With EDC contracts the total process can take nearly 2 years from RFP development to executed contracts approved by DPU.
6. **Bulky Purchases.** The current structure has big projects coming online every few years that causes disruption in the RPS markets.
7. **Inconsistent with Federal Markets**. Anything we procure is barred from participating in the competitive markets due to current federal market rules. This puts Massachusetts ratepayers at risk of overpaying for reliability: once in long-term contracts with clean energy, and again in wholesale markets from which those pr

There is widespread consensus that the current model of procurements is not sustainable with federal markets, ongoing federal actions, and **needs to be updated**.

FCEM Proposal

Forward Clean Energy Market (FCEM) is one option for an alternative to the procurement-based model:

- Adapt regional energy markets to allow renewable energy to participate and get financed through competitive markets
- How it works:
  - Regional entities place "demand bid" that represents desired targets for clean energy with a price cap
    - Entities may be states, towns, or even voluntary bids from organizations or corporations
  - Implementing agency runs a combined procurement for the full amount of demand bids
  - Sets a clearing price for all demand bids
  - Procurement is done annually, procuring for a period multiple years ahead



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Economic Development & Other Goals

- The current model of long-term contracting includes pursuit of other state goals like economic development, environmental justice, and diversity, equity, and inclusion in the contracting process.
  - For instance, Section 83C offshore wind RFP requires projects to demonstrate these additional benefits
  - While these goals are important, energy procurements are an imperfect mechanism for pursuing them:
    - Cost of commitments is spread over 20 year contracts and funded by all ratepayers
    - PPAs do not include enforcement mechanisms for these commitments
    - Utilities are not experts in evaluating these types of commitments
  - Neighboring states are increasingly pursuing clean energy economic development initiatives outside of procurement processes
- Switching to an FCEM model would separate pursuit of these state goals from the financing of clean energy
  - State would set targets for procuring clean energy in a dedicated competitive market
  - State could pursue economic development, environmental justice, and DEI goals through other processes, including:
    - Environmental permitting and reviews (e.g. CZM, EFSB)
    - HED economic development incentive programs (e.g. EDIP)
    - MassCEC workforce development grants and partnerships
    - Supplier Diversity Office certifications and support to industry
  - This would improve transparency and competition on the cost of economic development initiatives, improve the equitable allocation of costs, and better target initiatives.

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THANK YOU!

Clarifying questions?

- Type your questions in the chat, “raise your hand” to be called on and ask your question verbally (or request to do this in the chat if you don’t have that functionality), or press *6 when telephone callers are invited to ask questions.

Group Discussion

1. What are the key design parameters/considerations/issues when designing a 100% RES policy?
2. When assessing each design parameter, what criteria should be used to make decisions between choices?
3. What key issues can/should be addressed in a RES and what should be addressed with supporting policies or programs (e.g., changes to existing programs or new tools for renewable energy deployment)?

Additional Opportunities for CEP/CAP Comment

Comprehensive Energy Plan:

- Website (information on upcoming events and other avenues for providing input): https://publicservice.vermont.gov/content/2022-plan
- Email (to submit comments on the CEP): PSD.ComprehensiveEnergyPlan@vermont.gov

Climate Action Plan:

- Website (information on upcoming events and other avenues for providing input): https://aoa.vermont.gov/content/vermont-climate-council
- Public Comment Portal: https://anrweb.vt.gov/ANR/ClimateCouncil/PublicInputForm.aspx?PKID=3209

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Thank You!